FARMERS DIGEST

JULY, 1945

Volume 9 — 25c a Copy

Number 3 — $2.00 a Year

Before You Buy That Farm ..... *Iowa Farm Economist* 1

Time Studies in the Dairy Barn ..... *Certified Milk* 5

Stop That "In-Between" Mortality ..... *Turkey World* 11

Lubrication Pays ..... *American Agriculturist* 14

The Selection of Dairy Sires ..... *Pacific Rural Press* 16

What's New in Farm Machinery ..... *The Ohio Farmer* 19

New Pasture Grass ..... *The Farmer* 21

The Queen of All Fibers ..... *Farm and Ranch* 23

Grow Your Own Buildings ..... *The Michigan Farmer* 26

Farm Fire Drills ..... *The Dakota Farmer* 30

Labor Short-Cuts for Pullets on Pasture ... *Everybodys Poultry Mag.* 31

Growing Profitable Pullets ..... *N. J. Farm and Garden* 33

Influence of Thyroprotein on Milk Production *Holstein-Friesian World* 36

Tomato Pollenization ..... *Texas Farming and Citriculture* 43

Social Security for Farmers ..... *Land Policy Review* 45

This Problem of Inheritance ..... *The Shorthorn World* 52

Plants Vary Widely in Mineral Composition ..... *Wm. A. Albrecht* 57

Preventing and Curing Stiff-Lamb Disease ..... *Farm Research* 59

Methods of a Master Producer ..... *Hog Breeder* 61

New Wealth from Seed ..... *Pennsylvania Farmer* 66

Plant Breeding Key to Progress in Agriculture ... *The Utah Farmer* 69

How Much Should a Pullet Cost? ..... *Poultry Tribune* 74

"Black Sheep" ..... *Farm Journal* 77

Water Cress—A Big Business ..... *Market Growers Journal* 78

Decayed Fence Posts Unnecessary ..... *New England Homestead* 83

For the Farmer's Library 85

Index 87

The Farmer's Digest

EDITORIAL STAFF:

Editor—L. Bush-Brown Assistant Editor—C. Leavitt Dyer
Business Manager—A. E. Heick
Associate Editors—
John A. Andrew, Jr., James Bush-Brown, Ruth Patrick

ADVISORY EDITORIAL STAFF:

William A. Albrecht
Chairman, Department of Soils
University of Missouri

John D. Beck
Professor of Veterinary Medicine
University of Pennsylvania

Hugh H. Bennett
Chief, U. S. Soil Conservation Service

D. B. Johnstone-Wallace
Assistant Professor, Department of Agronomy
Cornell University

H. J. Reed
Dean of the College of Agriculture
Director of the Experiment Station
Purdue University

W. T. Spanton
Chief, Agricultural Education Service
U. S. Office of Education

Howard B. Sprague
New Jersey Agricultural Experiment Station

M. L. Wilson
Director of Extension Work
United States Department of Agriculture

The Farmer's Digest
Published Monthly at Ambler, Pennsylvania
by the Farmer's Digest, Inc.

25c a Copy *1 Year $2.00*
2 Years $3.50 *3 Years $5.00*
Foreign and Canadian Subscriptions $2.50 a Year

Entered as second-class matter at the Post Office at Ambler, Pa., May 5, 1937, under act of March 3, 1879

The Farmer's Digest

Volume 9 July, 1945 Number 3

Before You Buy That Farm . . . Figure What It's Worth

Condensed from Iowa Farm Economist

H. E. Stalcup

Most farmers are aware that land prices have gone up sharply since war broke out. Some people say that prices have gone too high. Others insist that we are not yet in danger. This much is certain—land prices are high enough so that it behooves anyone to use all the information possible to find out what a farm is worth before he planks down his hard-earned cash for land.

Although there is no sure-fire method for telling what a farm is worth, we do have one that we can use to give us a pretty good idea whether the price asked is in line with what the place will earn over a period of years.

About 600 practical farmers, scattered all over the State of Iowa, tried out that method this winter. After they had applied it to typical farms in their communities, they concluded that while it was not a fool-proof method, it was the best available for figuring out what a farm was worth.

Land appraisers call this method the "production" method. They gave it that name because the method is based on figuring out what the production and net income of the farm is likely to be in the years ahead. They then capitalize this estimated income at a fair earning rate on the money to get the earning value for the farm.

Suppose you are considering buying a near-by farm. Here is the way in which you can use the production method to figure about what that farm is worth.

1. Put down the acres of crops you would grow on the farm in a normal year. Since you are trying to get the value of this farm over a number of years, you will want to put down a rotation that will maintain the fertility and crop yields on that farm.

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2. Put down what you think are the normal yields on that farm. You will want to take into account both good and bad years. Be honest. Sometimes we have a tendency to remember the exceptional yields of the last 7 or 8 years. We forget about 1934 and 1936.

3. Multiply the yield by the number of acres in crops to get the total crops you would usually raise.

4. Figure the landlord's share to carry the farm itself. Some folks wonder why the entire share of the farm's crops is not used to figure the income. The reason is this. The operator's share goes to pay for farming expenses, the family living and to give the operator a return on his own labor. Furthermore, some day you may want to rent that farm. You will then want to have made your deal on a basis that would permit the farm to carry itself if you moved to town and received the landlord's share of the income.

5. Estimate the prices for the different crops you will receive over the next 15 to 20 years. Paying for a farm is a long-time proposition. You don't pay it off in a year or two. In figuring the earning power of a farm, you have to take into account the possible prices you will receive for crops from that farm for several years ahead. Cash rent acres (pasture and hay) should also be accounted for here, at the average rent per acre.

We don't want to use present high wartime prices. We don't expect these to continue over the next 15 to 20 years. We may have to go through another depression period like the thirties. But neither do we want to use depression prices.

Thus, our best estimate as to what the prices will be in the future will probably leave us somewhere between depression prices and the present abnormally high wartime prices. Perhaps the safest thing to do is to use a set of long-time prices for farm products.

6. Using these long time prices, figure up the total income this would bring. This gives your estimated normal total income from the farm.

7. Take the expenses the landlord normally would have. These would usually include taxes, insurance, seed, lime, fertilizer and maintenance on buildings, fences and tile. It's best to set down the estimated expense for each one of these rather than making a flat estimate per acre for the farm.

Actual experience of farm owners has proven that these expenses amount to more than the traditional $1.00 an acre that many folks have long assumed. Particularly watch the figure on taxes. Tax rates vary widely

from one tax district to another. A high tax rate will make a sizable cut in the earning power of your farm.

8. Decide on a fair earning rate on your money and then capitalize your estimated net income to get the estimated value of the farm. Since a farmer has to run the risk of a short crop, storm damage, corn borers, chinch bugs and grasshoppers, most farmers figure that a farm ought to earn 5 percent on their money. This is another way of saying its value is equal to 20 times its annual earnings.

Of course, there also are other things that you will want to take into account in figuring the value of your farm. Maybe the farm building or the house need a lot of repairs or remodeling. This will lower the value of the farm by the cost of putting those buildings in shape. But maybe the buildings are above average. Perhaps the home is exceptionally nice. Possibly the farm is close to school or to your church. The farm might be on an especially good road or close to good markets. All these things may increase the value of that farm to you.

However, we must remember that convenience to church or school or an exceptionally nice home probably will not increase the production of a farm. Paying a little more per acre for a farm in order to get these things puts you in the same boat as the man who buys an exceptionally nice home in town. You have a nice home—but that doesn't bring your business greater profits.

It is well to remember that this method is not fool-proof. If you want to kid yourself you can use this method to make yourself believe a farm is worth about any figure you desire.

You can use higher yields for the different crops than you are likely to get on the farm. You can use optimistic prices for the crops and boost the landlord's income by that method. You can be unrealistic about the expenses a landlord is likely to encounter in buying such a farm.

In other words, this method is only a tool in your hands. Like a hammer, you can use it to construct a solid foundation or you can use it to build a flimsy structure. It all depends on how you use it.

And since this method is an effort to look into the future and since none of us knows the future for sure, it introduces the many uncertainties that the future holds. When used with reason and a little common sense, however, the production method of appraising a farm does offer means for reducing those uncertainties as much as is humanly possible.

HOW PRODUCTION VALUE WAS CALCULATED

Land Use and Acres	Normal Yield	Total Production	Landlord's Share	Amount to Landlord	Normal Price	Total Income
Corn .....61 A	48 bu.	2928 bu.	1/2	1464 bu.	.62	$ 905
Oats .....32 A	36 bu.	1152 bu.	2/5	461 bu.	.35	160
Soybeans .....10 A	20 bu.	200 bu.	2/5	80 bu.	1.04	85
Hay .....32 A	.....	.....	rented	for cash	6.40	205
Pasture .....27 A	.....	.....	rented	for cash	5.65	150
Lots, Roads, Waste, etc. ..... 5 A	.....	.....	....	.....	....	....
TOTAL .....167 A	.....	.....	....	.....	Total	$1505

Expenses

Taxes	$245
Seeds	95
Lime and Fertilizer	20
Insurance	20
Maintenance of Buildings, Fences and Tile	280
TOTAL	$660

Summary

Total Income	$1505
Less Expenses	660
Net Income	$ 845

Divide Net Income $845 by Interest Rate 5% = $169.00 and Multiply by 100 to get Value of Farm, $16,900. Divide Value by Total Acres to Get Value Per Acre, $101.

Sweet Potatoes Almost Equal Corn

Reports from the Oklahoma A. & M. College showed that dried sweet potatoes fed steers produced almost as fast gain, and the steers were appraised at the same price as those fattened on ground shelled corn. A yield of 250 pounds of sweet potatoes, culls, from land unsuitable for corn was equal in feeding value to corn at 58 bushels to the acre; but the steers fed sweet potatoes did not get as much protein and therefore needed nine-tenths of a pound of cottonseed meal per head daily. Test lots of steers fed sweet potatoes and those fed corn had balanced rations including alfalfa hay, silage and cottonseed meal. It required 530 pounds of dried sweet potatoes and 46 pounds of additional cottonseed meal to equal the gain made on 493 pounds of corn. The cornfed steers made an average daily gain of 2.17 pounds and those on sweet potatoes gained 2.11 pounds daily.

The Hereford Journal

Time Studies in the Dairy Barn

Condensed from Certified Milk

Ivan R. Bierly, Ph. D.

Extension Assistant Professor of Marketing, Cornell University, Ithaca, N. Y.

TIME studies are being made on more or less typical dairy farms in New York and several other states. Our objective in this work is more efficient farm operation.

Dairy farming today is a business, in every sense of the word. As with any other business, price minus cost equals profit. The price level under which a farmer operates at a given time is of major importance. But there isn't much that an individual dairyman can do about the level of prices.

Therefore, a farmer's success depends on his ability as a business operator to control his costs. His largest cost, and the most important thing he has to sell, is labor. On a dairy farm, he sells his labor to the cow enterprise. The return that the cows make for his labor depends on how effectively he sells this labor; or in other words, how much he accomplishes with it.

On most farms, part of the labor is hired. The farmer's level of living depends on how well he is able to sell his own labor, and his ability to sell the labor that he buys, at a profit.

On a group of selected farms the number of hours of labor to care for a cow varied from less than 100 to more than 200. The farmers who kept these records with the New York State College of Agriculture are quite a selected group. The very fact that they do keep these detailed cost records indicates that they are probably much more cost conscious than the average farmer. Nevertheless, there was more than 100 percent variation between the lowest and the highest farms in the number of hours of labor to care for a cow in a year.

The big question that this raises is why? Why is there such a wide variation between these farms in the amount of labor to care for a cow? What are the things that those farmers who use the least labor per cow are doing that makes it possible for them to get by? What are the things that those farmers who use the most labor are doing, or are not doing, that makes it necessary for them to use twice as much labor as the first group?

For many years it has been recognized that having a large herd makes it possible for a

Reprinted by permission from Certified Milk, New York City, April, 1945

farmer to have certain economies in the use of labor that are difficult of attainment to the same extent by farmers with small herds. This is just business management applied to farming. For example, as applied to dairy farms, it takes just about as long to assemble two milking units for 15 cows as for 50 cows; it takes just as long to make a trip to the hay mow to throw down hay for 15 cows as for 50 cows.

But an examination of the figures shows clearly that this reason alone does not explain the whole situation. Some of the farmers with 50 cows required twice as long to care for their herd as other farmers with the same number of cows. The same is true whether the herd size was 30, 20, or 15. So, while size of herd is important, it alone is not enough to explain these wide differences in the amount of labor to care for a cow.

The answer then, must lie in the methods that the farmers used in doing their work, and the equipment that they used, as well as the arrangement of their dairy stables.

The problem, then, on an individual farm with a given size herd, is, first to arrange the dairy stable for maximum convenience in doing the work, second, to use labor-saving equipment, and always have it where it is readily available when needed, and third, to organize the jobs so the operator works while he walks, uses equipment as efficiently as possible, and makes every move count.

Most farmers would agree with what has been said so far. And most farmers are interested, especially *now*, in finding easier and better ways to do their work. But the problem, from the farmer's point of view, seems to have been summarized by the farmer who said, "We are always glad to get new ideas, and to learn how other farmers do their work. If we have to develop new work methods ourselves, it is a long hard job."

The problem of finding an easier, and a better way, is probably no more difficult for farmers than for anyone else. It is hard for anyone to have an objective, critical and yet constructive point of view toward the methods used in doing their work, especially if it is their own work. On a job such as caring for the cows, which is done 730 times a year, it is not difficult to become so set on a certain routine that one ceases to question the various steps in that routine. Furthermore, psychologically speaking, it is, for some reason, much easier to be critical, and objective, toward what another person is doing, than toward one's own work.

This situation, then, is the reason for making time studies in

dairy barns. A floor plan of a dairy barn, a stop watch, a pad of paper, and a pencil, have no preconceived ideas as to how the jobs should be done. A careful record of the work that is done, the way that it is done, the equipment that is used, and other pertinent information, gives the basis for an objective analysis of the methods that are used, and almost invariably points the way for pertinent suggestions for improvement. At least, it gives a sound basis for raising serious questions as to methods which are being used, as compared with alternative methods.

Obviously, it would not be possible or practicable for a State College to attempt to provide a service to all of the dairy farmers in the state that would help them plan better methods on their individual farms. The objective of research and extension work in this field, therefore, is directed toward the development of a consciousness on the part of individual farmers of the opportunities for saving time and travel by an objective, critical study of the way in which the work is done. We have felt that one of the first steps in this direction is to make enough such studies on individual, and more or less typical farms to point out the importance in a year's time of saving a few steps and a little time each day. Dairy chores are done 730 times a year on each farm. Just one extra step each time the chores are done adds up to almost half a mile of extra walking a year. Just one extra minute of work each time the chores are done adds up to more than 12 extra hours of work in a year.

The detailed time and travel analyses that have been made during the last year by the New York State College of Agriculture show that on most of the 17 farms studied, and they were rather typical dairy farms in the central part of the state, many times one step each chore time, and many times one minute each chore time, could be saved by the development of a better stable arrangement and better methods.

For example, take the difference in time and travel to care for 20 cows on two of the farms that were studied. On one of these farms, the farmer and his son walked six miles a day in the winter season to care for 20 cows. On another farm, a farmer and his hired man walked only about 2 miles to do the same job. The extra 4 miles of walking a day on the first of these farms, over the period of 7 months during which the cows are kept in the barn, adds up to more than 800 extra miles of walking in a year. This extra walking is equivalent to walking from Grand

Central Terminal to Buffalo and back.

On the first of these farms, the farmer and his son spent 13 hours a day during the winter season to care for 20 cows. On the other farm, the farmer and his hired man spent 7 hours a day. The difference of six hours a day over a period of 7 months adds up to more than 1200 extra hours of work on the first farm. This is equivalent to 120 days, or about 4 months of time for a man.

In making this comparison of the experiences of two farmers, I have not been trying to show how large the savings in time and travel might be on New York farms. I am simply pointing out the great importance of making every move count in the dairy barn. On these two farms, essentially the same jobs were included in doing the chores. That is, hay, grain and silage were fed to the cows. The cows were milked with a machine on both farms. The stables were cleaned once each day. But the methods that were used and the care with which the jobs had been planned, were greatly different.

A careful drawing of a floor plan of a barn and milk house is the first step in a systematic study of dairy chores. This floor plan is a fundamental step, because reference to the floor plan sometimes helps one to understand why certain jobs are done in a certain way. Furthermore, a study of this floor plan almost always raises questions about stable arrangement and in this way leads to suggestions for rearrangement to save steps and time.

The time record, using a stopwatch, is made while the work is being done. The distance travelled in doing the work is noted at the same time, and can readily be estimated, based on the measurements made while the map of the floor plan was prepared. Such a chronological record of the time and travel to do the work, when studied along with the floor plan, gives additional information for an objective and critical study of the way the work is done. The relative importance of the different jobs in terms of time and travel is shown. This is helpful in appraising the possibilities of saving time or travel to do the major jobs. For example, "backtracking" in feeding is shown, and the length of time the milking machine is left on the cows is given. In taking such records, it is necessary to have one enumerator with a stopwatch to follow each worker.

In the studies made so far on typical dairy farms in New York and other states, the jobs done on different farms shows the importance of labor-saving equip-

ment, and of a carefully-planned dairy stable. The use of grain carts and silage carts saves one-half to two-thirds of the walking required to feed grain and silage by carrying these feeds in bushel baskets. Putting the load on wheels saves even more of the energy required to do the job. Most of these carts are home-made, built from materials available on the farm, and built to meet the needs of the farm on which they are to be used. This is important because no two dairy barns are arranged exactly the same, and for most satisfactory results, such carts must be adapted to the situation in the barns where they are used.

These studies also show that having enough small tools, such as brooms and scrapers, to make it possible to have them where they are needed, rather than to have just one of each in a barn, is an economical investment.

Reducing milking time per cow is one of the greatest opportunities that most farmers have to save time in doing their chores. In a study of 17 dairy farms in New York, only 3 cows in 10 were milked with a machine in 5 minutes or less. Experiences of many farmers, as well as experimental evidence, has clearly shown that cows can be trained to milk out in 5 minutes or less. Some cows can be milked in 3 minutes. Much depends on the way the cows are trained when they are young, and the way they are handled from then on. In this study, the average length of time the milking machine was left on the cows was 6¼ minutes. For a 20-cow herd, reducing the time to an average of 4 minutes would save ¾ of an hour a day. In a year's time that adds up to 28 ten-hour days, or one month's time for a man.

On some farms, we have found that the cows were being milked in the order in which they freshened, with the cows that have freshened last either being milked first or last of the whole string. This results in moving from one side of the barn, and from one end of the barn, to the other, unless the cows are stanchioned in the order in which they freshen, which is not always practicable. Milking the cows in about the same order as they stand in the barn is one easy way that many steps can be saved.

Combining some jobs saves steps and time. On many farms the teat cups on the milking machine are rinsed between cows. Where the milk is poured into a pail before it is carried to the milk house, arranging the rinse pails parallel to the carrying pail makes it possible for the teat cups to be rinsed at the same time that the milk is being poured from the milking machine into the carrying pail. In other words,

by the time the milk is poured out of the milker pail, the machine is already to go to the next cow.

The stop to pour the milk from the milker pail into a carrying pail has been eliminated on some farms by having an extra milker pail behind the cows ready for use. All that is necessary is to change the milker head from one pail to another.

Stripping the cows after milking required from a minute to 2 minutes per cow. If the machine is properly used, it should leave only a small quantity of milk in the cow's udder. Only 10 to 20 seconds to check on whether or not the cow was milked dry with the machine should be all that is needed. Many farmers apparently do not realize that milk production is more or less a continuous process, and thus they prolong the stripping period much longer than is necessary to try to remove all of the milk. No harm is done if a small quantity of milk is left in the cow's udder. Extended stripping is one of the things which, if continued over a period of time, tends to make a cow milk out more slowly, thus contributing to slower milking with the machine and making it much more difficult to use the machine correctly.

The milk house should, for the sake of convenience, be as near to the milking stable as possible and still conform to health regulations. The inside of the milk house should be arranged for maximum convenience in handling the milking equipment. Only one of the 17 milk houses on the farms studied in New York last year was so arranged that all of the equipment was in easy reach of the farmer while he was standing in front of the wash bowl where utensils were cleaned. On most farms, part of the equipment was stored on one side of the milk house, part of it on another side of the milk house, and, in some cases, part of it away from the milk house.

Care of young stock involves much work on some farms. Having them run loose in pens saves some of the time required to give them individual care in stalls. Apparently just about as good a job of raising the heifers can be done in this way, in the opinion of farmers who do it, if the heifers are not too crowded.

A heifer drinks several gallons of water a day. On one farm, to water 6 young calves, the farmer walks 3 miles a month, and half of the distance he was carrying water. On a few of the farms studied, the water was supplied automatically with the same kind of water buckets as used for the cows. On other farms, a tank is in place of the bucket, and water comes from a faucet above the tank.

Much of this discussion, based as it has been upon our experiences with more or less typical dairy farms in New York State, is not directly applicable to the somewhat different situation on the larger, certified-milk-producing farms. But, based on our limited observations of typical farms, and upon the experiences over a period of years of industrial engineers in the development of labor and cost-saving methods in industry, I am certain that this kind of an approach to the problem of more efficient use of labor is just as applicable to your kind of farm operation as to the typical farm.

Stop That "In-Between" Mortality

Condensed from Turkey World

Boyd Ivory
South Dakota State College

TURKEY growers dread the time when they must change their poults from the brooder house to the range. This is the time when losses result from what we call "in between" or adolescent mortality.

During the early part of the brooding period, poults have become accustomed to the brooder house and its environment. They have been eating there, drinking there and living there, making themselves at home in surroundings familiar to them since they were first set out under the brooder stove.

At about 8 to 10 weeks of age, the poults are old enough to start living in a new environment. The time has come when they must go out on the range to continue to develop into birds for the holiday table. With this change in life it is necessary to change the conditions of environment. This is the time when losses are over which might be charged to poorly hatched birds and weak poults. From now on, keeping mortality low is a direct responsibility of good management.

Mortality control is a limiting factor for turkey profit for most growers. The mortality problem becomes even more important when we consider that the birds that die represent 3 separate losses. First there is a loss of the turkey itself; second there is a

Reprinted from the Turkey World, Mt. Morris, Illinois, April, 1945

loss representing the accumulated "room and board" bill; and third and very important, there is a loss on the opportunity of making a profit on the poult.

In checking mortality records, we find losses highest during the first week of brooding, in many cases due to poorly hatched birds and poults low in vitality. The mortality declines rapidly until about the eighth week when we find it bouncing up for a short period of time which represents this "in between" mortality, which may be caused by poor management during the period. This is the adolescent period when poults are making the change from life in the brooder house to life on the range. This is the time when turkey growers must beware of their management practices and try to keep down this hump in the mortality curve. Losses which occur during this period, in many cases, determine the success or failure of the turkey enterprise.

Briefly, some of the changes which occur at this time might be as follows: the change from artificial to natural heat; the change from an inside environment to the natural conditions prevailing outside; change in equipment, that is, from small feeders to large ones; a change from a starting feed to a growing feed, and also additional entries on the menu in the form of whole grains where they have not been receiving scratch feeds; and learning to roost outside instead of sleeping around a brooder stove.

A turkey is by nature a suspicious yet inquisitive individual. It will notice even the most minor changes affecting its habits and in many cases outbreaks of disease may be traced to these changes in management which have caused the birds to go off feed and be so reduced in vitality, that disease strikes. Experienced turkey growers will recall the suspicious nature turkeys have when they have filled their feeders with a mash of a little different color. Remember how they crowd around the feeder with their necks stretched in the air, giving the new feed the "eye" for several minutes before taking a try at it.

It is a good practice to make all changes gradually and subject your poults to only one change at a time. Getting the birds outside the brooder house is probably the biggest problem. In making this change too suddenly, it will have a detrimental effect on the health of the birds and may even cause piling, and heavy losses will result. Many growers encourage the poults to roost out on sunporches; in this way they become accustomed to being chilly at night, with artificial heat still available inside. When they are ready to make the

complete break from the brooder house, these sunporches may be moved out on the range, dismantled except for the roost, and become part of the range equipment. In this way the poults will be used to roosting outside and will also be familiar with the roosts they are going to use on the range.

Roosts used on the range should be protected in some way to keep the driving force of the wind and rain, during the spring storms, away from the birds. Some small growers have simply moved the brooder house out on the range and this becomes range shelter with additional equipment being provided when it is needed. In this way, the turkeys start roosting outside whenever they so desire.

With feed and feeders, it is advisable to change either one or the other at a time, never make both changes at the same time. Keep using your old feeders when starting the birds on new feed. After they are eating the new feed, then you can change from small hoppers to larger range hoppers. Keep a few of the smaller hoppers with feed available to the birds while they are becoming acquainted with the new equipment.

If scratch or whole grain is to be fed, it should be placed before the birds long before they actually need it, then by the time they do need it, they will be used to eating it.

Range shelters, even though they are inexpensive and temporary affairs, are a big help in keeping the birds comfortable on the range and, more important, during their early adolescent period, than later when the turkeys are larger.

Recognize the nature of turkeys. Guard against minor problems of management which can cause high mortality during this "in between" period.

Cornstalks Are Valuable

One of the best sources of organic matter in the soil is cornstalks. The introduction of a corn crop into the rotation and plowing under the stalks after the ears have been harvested is one of the best ways of raising the organic matter content of the soil and improving its crop-producing power.

—N. J. Farm and Garden

Lubrication Pays

Condensed from American Agriculturist

Paul R. Hoff

LUBRICATION routs the two arch enemies of farm machinery—rust and friction. Rust takes its toll in shortening the life of farm machinery when it is idle and friction takes its toll when the machinery is operating. Friction wears out gears, chains, sprockets, drive shafts and bearings. Lubrication minimizes friction and the resulting wear. Oil and grease can be compared to tiny ball bearings that keep metal surfaces apart. If the lubrication is adequate—a sufficient amount of the correct "weight" of oil or grease—wear is reduced to a minimum and the life of the machine is prolonged. An insufficient amount or the wrong viscosity of lubricant allows the metal surfaces to rub together and rapid wear occurs. The length of life and freedom from trouble of any farm implement is determined largely by the lubrication that it receives. The expense and time invested in good lubrication pay large dividends.

Over the years, farm machinery manufacturers have provided their implements with lubrication arrangements that have varied from a simple oil hole in a sleeve bearing to the latest model pressure fittings. Oil holes, oil cups with or without wicks or covers, grease cups, pressure gun fittings and enclosed gear cases are all part of the lubrication systems of farm implements. Each method of lubrication requires its own lubricant and a different viscosity may be necessary if a machine is operated in cold weather, than is used in warm weather.

OIL HOLES. A small amount of oil put into each oil hole frequently gives better lubrication and wastes less oil than does a large amount applied once or twice a day. On slow-moving horse-drawn implements, lubrication through oil holes is satisfactory if the oil is applied often. *The practice of going over the implement with the oil can each time the horses stop for rest has undoubtedly prolonged the life of many farm implements.* When horsedrawn implements are operated at speeds higher than they were designed to run, as behind a tractor, the oil hole system may not furnish adequate lubrication unless stops for oiling are made *more frequently.*

Oil holes that are exposed to dust and dirt may need to be

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cleaned out each time the machine is oiled. Frequently oil holes that are hidden by dirt are overlooked and that particular bearing receives no oil. Usually there are two bearings for each moving shaft and each should be located and oiled.

SAE 30 or 40 motor oil is usually recommended for implements operated in summer and a lighter oil for winter. Badly worn bearings may require a heavier oil—SAE 50 or 60.

GREASE CUPS. Grease cups were used before pressure fittings were developed to force lubricant into bearings. Because of the limited pressure of small diameter grease cups, it is difficult to force out the dirt and old grease and to fill the bearings with fresh grease. This type of lubrication is more positive if the dirt and caked grease are cleaned out of both the grease cup and the bearing before attempting to force in fresh grease. Only grease that is especially designed for this type of fitting (cup grease) should be used.

PRESSURE FITTINGS. Pressure gun fittings give the most satisfactory lubrication to bearings and spindles on farm machines. A hand pressure gun is capable of developing several hundred pounds pressure and this is enough to force dirt and caked grease out of the bearing and fill it with clean fresh grease.

The lubrication of any farm machine can be improved if the grease and oil cups are replaced by pressure fittings. Usually the pressure fitting will screw into the threaded hole where the older grease cup or oil cup came out. Oil holes can be drilled to the correct size for drive-in pressure fittings or threaded for screw pressure fittings. Pressure fittings should replace other methods of lubrication on any horse-drawn implement that is used behind a tractor, because oil hole and grease cup systems do not provide sufficient lubrication for the higher speed and less frequent stops for oiling.

A good pressure gun (chassis) lubricant has a sticky, clingy consistency that stays in bearings notwithstanding the pounding and jolting of farm machines. It stays in the bearings in wet weather when a less water-resistant lubricant would be washed away. Any pressure gun grease should clean the bearing as well as lubricate it. For that reason, new grease should be forced into the fitting until the old grease is forced out and the fresh grease appears at the edges of the bearing.

Clean each fitting before lubricating. The purpose of lubrication is to fill the bearings with clean fresh lubricant. If the fittings are not wiped clean of dirt or oil holes not cleaned out, dirt

particles are carried into the bearings with the oil or grease, where they act as an abrasive. Containers must be kept covered to exclude dirt. Grease and oil cans, grease cups and grease guns must be filled under clean conditions.

Experience has demonstrated that the common practice of putting used crankcase oil on wearing surfaces does not prevent rusting over long periods of time. Even the application of new oil is not effective on machinery that is stored over winter. Plow shares, moldboards, cultivator teeth and other bright parts on machines that are stored for some time should be covered with heavy grease or with the rust preventative material that can be purchased from many of the well known oil companies. Immediately after a machine is used the last time before storing, the bright surface should be cleaned and grease or rust preventative applied. Neither grease nor rust preventative will remove rust but both will prevent the formation of additional rust.

The Selection of Dairy Sires

Condensed from Pacific Rural Press

P. W. Gregory

College of Agriculture, Davis, California

DAIRYMEN know the value of proven sires but they also know that such sires are usually beyond their reach, for it is only rarely that one is offered for sale. A proven sire at the head of each dairy herd is the ideal but in actual practice it can never be attained. How then can dairymen select sires that will consistently improve production in their herds or at least maintain production in high producing herds?

The investigations of the Bureau of Dairy Industry of the United States Department of Agriculture on sires proved in Dairy Herd Improvement Associations show that approximately as many bulls decrease as increase production. Production is increased in herds that are fortunate in selecting sires that uniformly transmit high production, but this gain is offset in other herds by sires that transmit low production. When the nation as a whole is consid-

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ered there is no obvious improvement in the germ plasm of our dairy stock. The present basis for selecting sires that transmit high production is about equal to coin tossing or a 50:50 chance.

If the inherent productive capacity of our dairy stock is to be improved it must be brought about by improving the basis for selecting sires. In other words there must be an increase in the proportion of good sires selected and a corresponding decrease in proportion of poor sires.

If a sire is to increase the production of daughters over their dams his germ plasm for production must be superior to that of the cows to which he is mated. As a general rule, in order for a sire to possess better than average germ plasm for production both of his parents must possess better than average germ plasm for production. The problem then is to be able to consistently locate young bulls that have better than average germ plasm. These bulls can only be found by making use of progeny tests.

If a progeny test is to be valid, certain conditions under which it is made have to be fulfilled. (1) All daughters that freshen should be tested, or the daughters tested must be unselected. This method precludes the practice of testing the more promising daughters and allowing the less promising ones to remain untested. (2) An adequate number of daughters must be tested to properly evaluate the germ plasm of the sire. Ten unselected daughters give a fair evaluation but the more tested daughters the more accurate the evaluation. (3) All tests should be made under uniform conditions of feeding and management to eliminate possible effects of environment.

After a sire has had a valid progeny test, his germ plasm for production is evaluated and he can then be classed as a proven sire. Actually, a proven sire can transmit low, intermediate, or high production. The desirable proven sire is one that uniformly transmits high production to his daughters.

Some dairymen believe that one high producing daughter proves that the sire has superior germ plasm for production. This is a fallacious belief and is a pitfall to be avoided.

All the necessary information for locating bulls that uniformly transmit high production is available in those herds that have carried on production testing over a period of years either in a county cow testing association or official testing. Dairymen as a group should be encouraged to make more extensive use of these records in selecting herd sires.

What then should the dairymen look for in selecting a young bull? If an inspection of a pros-

pective bull shows that he is normal and in good health, attention should then be centered upon his parents. (1) The dam should have a good record and her sire should be proven to uniformly transmit high production to his daughters. In other words, her paternal half sisters should have good records of production. This is sufficient evidence to prove that the dam has better than average germ plasm, but if one were extremely critical, the records of other close relatives such as the daughters of her half brothers or her own progeny could be checked. (2) The sire of the bull in question should be proven to uniformly transmit high production. This means that the paternal half sisters of the prospective bull are high producers. Most of the herd sires selected in this manner will increase production but because of the mechanism of inheritance a small percentage of bulls will fail to make increases or may even cause decreases. However, the percentage of failures under this system of selection will be much less, than those encountered under present methods of selection. It should be clearly understood that failures encountered with this method of selecting sires can not be attributed to a faulty basis of selection but to the mechanism of inheritance itself.

It will require time and careful study to select a bull on the basis outlined above. The dairyman should also understand that it is not necessary to go to a distant state to select a good sire. In all probability he can get one from his own or a nearby county, perhaps a neighbor, through the proper use of cow testing association or official testing records.

Buying Fertilizer

To get the most for the fertilizer dollar in 1945, E. L. Worthen, Cornell University, suggests:

1. Buy unmixed fertilizer. Use as such or mix just before applying.

2. If you buy mixed goods, select the highest grades obtainable. For example, the 8-16-8 or 10-20-10 instead of the 5-10-5; and the 8-16-16 instead of the 5-10-10.

—*Shorthorn World*

What's New In Farm Machinery

Condensed from The Ohio Farmer

R. D. Barden

FARMERS everywhere have been asking this question, "What new things will be available in farm machinery?"

No one would question the relationship that exists between labor and machinery. During the war period when labor has become increasingly scarce, machinery has filled the gap to make possible the heavy crop production we have enjoyed during the past few years. In many cases not enough new equipment was available to fill these gaps. Equipment already on hand worked longer hours on more farms. Custom operation, joint ownership, exchanging equipment for labor and many other plans all contributed their share in doing a wartime job.

Recently the writer contacted the farm machinery manufacturers' representatives in regard to the newer things to be produced this year. In most cases this equipment is available only in limited quantities but can be purchased generally when production facilities are improved.

Massey-Harris listed as one of their newer machines the self-propelled combine built in sizes small enough for Ohio farms. An overall width of eight feet, nine inches and a width of cut of 84 inches will clear the average farm gate and open up a field any place and prevent loss of grain in the back swath.

John Deere suggested the forage harvester, bale elevator, and Model 200 corn picker. Design trends in the Model 200 corn picker have indicated the possibility of simplification and less weight in a farm tool that is used in the field at a period of the year when soil and moisture conditions may be undesirable.

International Harvester Company indicated the new 50 T one-man automatic slice type pickup baler as one of their late additions. Handling of hay both at the field and at the barn has been a difficult job. Little improvement has been made since the advent of the side delivery rake and web loader until the last few years. One-man pickup balers, bale elevators, forage harvesters, buck rakes, have all contributed their part in taking some of the hard work out of haymaking. The use of barn drying is needed to help control weather,

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and thus improve quality and feeding value.

Allis-Chalmers adds the forage harvester and pickup baler as their contribution to the haymaking process. Since the forage harvester is a tool that is adaptable to many jobs on the farm—such as, grass silage, field cured hay, combined straw, corn silage and possible corn fodder bedding—it may receive wide acceptance. Allis-Chalmers pickup baler forms a round bale wrapped with twine. This is a new principle in field baling. Its speed in operation is due to the fact that a large swath may be collected. The machine is stopped for the wrapping operation.

Case Company includes the pickup baler and plow-down method of fertilizer application. The Case baler is well known to Ohio farmers. Plow-down application of fertilizer has shown striking results in tests made by the Ohio Agricultural Experiment Station.

Oliver lists one of their contributions as the Raydex plow. With the widespread use of the steel plow in Ohio the problem of sharpening plow shares and retaining original share measurements became very troublesome. The Raydex plow that uses shares low in price, replaceable like razor blades, has helped solve the share sharpening problem.

Ford-Ferguson suggests the manure loader as a contribution toward increasing the pleasures of farming. Many of the farm jobs have been handled in the same way for years with little concern for making the job easy. Our attitude has been too much that of the pioneer who is busy conquering the country rather than developing the refinements of living. Labor-saving devices on the farm and in the home will help make the job of chores more pleasant as well as easier to do.

New Idea contributes the grain elevator as one of the farm conveniences that helps lower the peak labor requirements of the harvest season.

Since many new machines will appear in the post-war period the prospective purchaser should examine carefully the new machine to see that it fits his farming method, contributes to his efficiency in the use of labor, has reasonable assurance of staying on the market and is a safe machine to operate.

New Pasture Grass

Condensed from The Farmer

A HIGH yielding wheatgrass which doesn't go through a period of dormancy in the heat of late summer, one which is equal, and to sheep superior to Brome in palatability, which grows 30 to 48 inches high, and which is adaptable to that wide stretch of country from central Minnesota west to the edge of the native grass ranges of the Dakotas is being named and released by South Dakota State College in Brookings.

The new grass is Ree wheatgrass named after the Reed Indians, an agricultural tribe, and it is a selection from plants grown from seed imported by the United States Department of Agriculture from the Maikop region of Russia in 1932.

First trials were at the Dickinson and Mandan, N. D., stations, then at Fort Collins, Colo., Pullman, Wash., and Bozeman, Mont. The first seed was brought into South Dakota in 1937 by Wayne Austin of the United States Soil Conservation Service, and there under the observation of Clifford J. Franzke, assistant agronomist, the first selections were made — selections which finally led to winnowing out Ree, the strain which Mr. Franzke has been increasing.

Experience with the new grass at South Dakota State College has been interesting. Sheep were turned into one 3½-acre pasture on the College's north farm in March of last year. Blades then were just pushing through the soil surface, and the sheep kept them chewed down until early in May when it was fenced so that some seed could be produced. There was a tiny peninsula of Ree grass that ran out into a Brome grass pasture where sheep were grazing, and they kept that bit of pasture almost shaved all summer, showing a marked preference for it even when there was an abundance of Brome. Other classes of livestock also find it palatable.

The new grass is closely related to Slender wheatgrass, a native to South Dakota, and to Crested wheatgrass which has rapidly gained in popularity during the past several years. The plants vary from light to dark green in color and stand quite erect. The stems are medium fine to large, coarse and leafy, and there is an abundance of leaves at the base of the plants. Seedling plants are large and strong and show a marked resemblance to newly emerged winter rye seedlings.

As a seed producer the new

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Ree wheatgrass compares favorably with the highly productive Crested wheatgrass and surpasses Western wheatgrass.

There is no seed of the new grass available for general distribution this season. A limited quantity is being distributed by the College this spring to members of the South Dakota Crop Improvement Association in counties where there is a prospect of obtaining highest seed yields, so likely some seed will be offered for sale in 1947.

Seed Hay

The spreading of "seed hay" may prove the most practical and economical method of revegetating badly eroded and gullied lands and bare spots in pastures on many farms. Seed hay is mature hay containing seed.

In the tests carried on at the Rod Plains Soil Conservation Experiment Station, Guthrie, Okla., in 1942 a part of the test area was planted with seed hay, another part with threshed seed. The quantity of seed applied to the acre was the same. The seed hay was applied at the rate of 1,500 pounds an acre, and was pressed into the soil by rolling with a cultipacker.

The seed-hay method produced a density of grass two and one-half times as great as that produced from the threshed seed. By the end of the second growing season, the density on the seed-hay area was about the same as that of virgin native grass.

The mulch material of the seed hay protects the soil from erosion and makes conditions more favorable for the establishment of the grass seedlings. As the residual material decays, it releases organic acids and food for bacteria and worms, and adds organic matter which is essential for germination and growth of the grass and improvement of the soil.

On most farms there are some wayside places along roads or meadows where native grass usually produces excellent seed. This grass may be mowed immediately after the seed matures, stacked, and spread on eroded land the following spring. If the seed crop is heavy, it may be desirable to spread the seed hay obtained from 1 acre over 3 to 5 acres and apply straw or other disease-free and seed-free mulching material over the hay. Usually 1,500 to 2,000 pounds of hay or of hay and straw to the acre will give satisfactory results.

—The Shorthorn World

The Queen of All Fibers

Condensed from Farm and Ranch

Herman W. Hawker

President of the Leone Plantation, Incorporated, Teague, Texas

About eight years ago, the late W. P. Simpson, a retired textile man of Philadelphia and owner of Leone Plantation, the 19,000-acre property in Leon county, Texas, of which I have charge, came down for his annual inspection. In a discussion of the experimental projects, which are a part of the program of the plantation, he asked me, "What do you know about ramie?"

My reply was, "What is ramie?"

His answer was, "It is the queen of all fibers, and has more possibilities than any of the known fibers, either natural or synthetic. I think we ought to experiment with the growing of ramie on the Plantation." So it was up to me to start out from scratch and learn something about ramie.

My first source of information was a bulletin of the United States Department of Agriculture, which was rather old and very general. The Texas Agricultural Experiment Station had no information, except that they had tried to grow ramie at Beaumont, in fact had a plot there at the time, but they did not think much of it. A few plants had been grown in the Rio Grande Valley. A call on the United States Department of Agriculture was very discouraging; the fiber expert there stated flatly that he saw no reason why anyone should want to spend any time on ramie; that there were plenty of fiber plants to supply present needs without fooling with ramie, and that he saw no future in the growing of the plant in the United States. Had it not been for the enthusiasm of those who were experimenting with ramie in Mississippi and Louisiana, I think our investigation would have ended then and there.

However, being hard-headed about the matter, we decided to experiment with the growing of ramie, procuring 1,000 root stocks of known Oriental origin, which were planted on three different types of soil, namely, sandy overflow soils, second bottom soils, and on the sandy upland soils of the Gulf Coastal Plain.

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Ramie is also known as Rhea, and China grass. It is a shrubby plant, sending up straight stalks from a perennial underground root stock which attain a height of from 3 to 8 feet before it begins to mature. Varying with the climate and rainfall, meaning by climate particularly the length of the frost-free season, from three to five crops are obtained annually in the southern United States. In our location, we have obtained four, but the average, due to shortage of rainfall in the summer season, has been three.

The plant may be propagated from root cuttings, stalk cuttings, or layers. We have found that root cutting propagation is much more satisfactory, and is nearly fool-proof. When properly prepared, the roots stand shipment for long distances, and in our work we have shipped over a million root cuttings to such destinations as Cuba, Spain, Mexico, Guatemala, various parts of South America, and the Philippines, as well as various parts of the United States.

On maturing, the outer bark becomes brown and thickens, and the fiber is at maximum quality, quantity and strength. Following cutting, the roots immediately put out the succeeding crop. The fiber is contained in the inner bark and constitutes from 1 to 4% of the entire plant. Under proper conditions, ramie may produce as much as 500 to 800 pounds of fiber per acre annually. The individual fibers range from 5 to 22 inches in length, and are very fine in texture when separated in individual units. When green, the plant consists of about 90% moisture. Green weight tonnages of more than 20 tons per acre have been obtained.

Ramie is stronger than any known fiber. It has a tensile strength three times that of hemp, four times that of flax, seven times that of silk, and eight times that of cotton. When properly processed, it equals silk in its brilliance, and its luster is equal to that of mercerized cotton. Its strength is increased by immersion in water, and it is very resistant to rotting, mildew and other bacterial action. It is also very resistant to changes in temperature and is very little affected by moisture so far as shrinkage is concerned, making it the very opposite of wool and mohair. Ramie is very resistant to wear, and dyes easily and beautifully, taking up moisture easily and drying quickly. The fabrics are cooler than cotton and warmer than linen, if such a paradox can be imagined.

With all of these fine qualities, it is remarkable that the fiber has not found greater use in American textiles, for ramie has been known in this country for over 80 years, when a representative

of the United States Department of Agriculture sent some root cuttings to this country from China.

We may then ask ourselves in all seriousness why, up to now, ramie has not been utilized to the extent that this queen of all fibers demands.

Our experiments on Leone Plantation soon showed us that ramie could be produced on well drained, fertile upland and alluvial soils in the southern United States in areas having plenty of moisture well distributed throughout the frost-free season. They showed us that ramie would be a godsend to agriculture in many areas which had depended in the past on cotton, now too expensive to produce in competition with cheap-labor foreign countries, except by Government subsidy. Once planted, the perennial rootstock of ramie will continue to produce season after season until the expanding roots fill the middles of the rows and become root bound, at which time replanting is necessary, generally after four or five years. No insect pests or blights have been encountered. Chief labor cost is to keep the fields clear of weeds. Occasional fertilization becomes necessary, but in quantities no greater than are applied to cotton. Even in our area in Leon county in central East Texas, where moisture conditions are not optimum, we produced beautiful ramie, cutting up to three crops per year.

Our investigation showed the greatest factor holding back ramine was mechanical decortication, or removal of the fiber from the plant.

It is said that many years ago the British government, realizing the value of ramie, offered a reward of £50,000 Sterling for the invention of a successful machine to decorticate ramie. The literature of the patent offices, in this country and abroad, is full of machines designed for that purpose, indicating the efforts that have been made.

At least six projects are under way involving the building of decorticators. Some of these projects are ambitious, others rather small. One of our large American corporations has been working on decortication for five years, but now claims it has a successful machine which will go into production as soon as wartime restrictions on steel are released.

But the prime thought is that sooner or later someone is going to produce a successful and efficient decorticator for ramie, or there may be several successful machines. Then ramie is going to take its rightfull place in American agriculture and textiles, as the queen of all fibers.

Grow Your Own Buildings

Condensed from The Michigan Farmer

FARM buildings, that are fire resistant, insulated against heat and cold, non-rotting, moisture, rat, termite proof, light in weight, simple of erection and—above all—low in cost may soon be in common use on Michigan farms.

These buildings are not something vainly imagined but a definite probability as the result of more than a year's tests and experiments just completed at the University of Michigan. Although the work was carried little beyond the laboratory stage, it does give promise of better, cheaper buildings for the farmer.

Insulative concrete was the material tested. Almost unknown to the American public, it consists of a mixture containing 3 principal ingredients: ordinary portland cement for binder; organic and inorganic fibers for bulk and light weight; and a small quantity of chemicals which lessen the amount of cement required prevent harmful shrinkage and increase the strength. A fourth essential in most buildings would be a stiffening framework of extremely simple construction.

The $18,000 research program tested more than 8,000 specimens of compositions made from various combinations of 250 different kinds of raw materials. Carried on in the Engineering Research Laboratories of the University at Ann Arbor, the work was sponsored by the Office of Production Research and Development of the War Production Board.

In charge of the project was Corwin Willson of Flint. A designer and inventor, Willson has served as consulting architect for FPHA and among his recent inventions are various systems of prefabricated construction and improvements in automotive vehicles.

Many advantages are promised by insulative concrete. For one thing, it can use materials that now largely go to waste: peanut hulls, cotton stalks, rice and wheat straw, cornstalks, flax shives and sawdust. Among the best fibers, however, are some which Michigan "grows wild" in abundance: those prepared from our jack pine and from wintercut popple or aspen. The fiber is prepared by de-barking the wood and feeding it into a steam hog

Reprinted from The Michigan Farmer, Detroit, Michigan, May 5, 1945

or grinder equipped with a ⅛-inch screen.

It is these cheap fillers which give insulative concrete its light weight. Gravel concrete averages about 150 lbs. to the cubic foot. Insulative concretes vary from 35 to 80 lbs., depending on the amount of cement used and the strength desired. Insulative concrete at half the weight of ordinary concrete is more crack resistant and at one-third the weight has ample strength for building construction.

Once all that was asked of a farm building was that it should keep out rain and snow. Today and even more tomorrow the demand will be for better insulation: warmer in winter and cooler in summer. Cows, chickens and hogs all will produce a greater return if much of the food they eat does not have to go merely toward keeping them warm.

Light weight concrete boards 2 inches thick showed almost as great insulation value as 2 layers of celotex between facings of plywood and having a total thickness of $2\frac{1}{16}$ inches. The exact test figures were 0.2238 for the latter and 0.2759 for the insulative concrete.

One important characteristic of insulative concrete is that it will not support combustion. It will char when exposed to an intense heat, but not burn. When a blowtorch flame was directed on a panel of insulative concrete for 20 minutes, the outer ¼ inch of the surface was injured but the damage stopped there. Because of its high insulative value, it withstood an intense flame better than ordinary gravel concrete. One surface chars but keeps its strength while the other conventional material goes to pieces.

All materials have their good and bad points. One of the immediate disadvantages of insulative concrete is that it requires specially prepared fibers. The juices in ordinary farm wastes, such as straw and cornstalks, usually contain substances that are harmful to the set of the cement. It is not difficult to remove these. But the special treatment required may take more time than the farmer has available.

Proper mixing is another difficulty. The best results are obtained in all concretes by using no more water than is necessary to make the mix easy to handle. Existing concrete mixers are made to mix heavy ingredients. The extreme lightness and bulk of insulative concrete require for best results a slightly different kind of mixing action. Until changes can be made in existing types of cement mixers which will better fit them for this purpose, it is possible to mix insulative concrete in a standard cement mixer by using slightly

more water than is desirable for best results.

These disadvantages are no greater than those normally attending the use of any new material and will be ironed out as better equipment becomes available. Moreover, these drawbacks appear to be offset by one advantage which should make insulative concrete of particular value for building construction on the farm. As Willson explains it:

"Most of our buildings today are descended directly from old Stonehenge. Basically they consist of upright posts supporting the horizontal top parts, and of a covering for the framework thus formed. So long as we had an abundance of good cheap lumber, that method served us well. But lumber is becoming increasingly poor in quality and high in price; masonry is even higher in cost and less insulative. We must find new and better materials and rely on more economical architectural principles.

"This is especially true in connection with farm needs. With lumber at its present level—and postwar reconstruction apt to make matters worse for the farmer—it usually costs more to put up new farm buildings than those wholly dependent on farm income can afford. Insulative concrete, in a type of construction which the farmer can manage himself, offers a solution to this problem."

The construction method is of interest. Thin wooden strips are woven to form a lattice-like reinforcement and stiffening, the lath-thick uprights being positioned in pairs spaced some distance apart. This distance may vary from less than 2 to more than 4 feet depending on the load imposed on the lattice by the thickness of the covering, the span between sill and ridge, and the density and strength of the insulating concrete. The roof may be round or resemble a pointed arch. To provide added headroom, the rounded sides may bulge slightly outward above the foundation.

Any flexible sheet material can be nailed to the inside of the lattice to provide a fixed form to hold the insulative concrete as it is applied in the plastic state over the lattice. Or a section of a movable form may be provided and the sheet liner dispensed with.

The construction thus described resembles one of the oldest types known, the "wattle and daub," which was tested and found effective by hundreds of generations of our primitive forebears. In Greece to this day, countryfolk fasten reeds to a wood framework and apply a stucco over the reeds. In the construction here being described,

however, the wall thickness is from 2 to 3 inches. That such a lattice framework requires a minimum of lumber may be seen from the fact that one 2x4 stub can be ripped into 6 strips ½ inch thick or more strips of lesser thickness. Almost any lumber will do, even that cut from the farmer's own woodlot, providing it is thoroughly seasoned.

Suppose a farmer wants a hog house 15x30. If the pairs of uprights are spaced 4 feet apart and are ½ inch thick, and if the interwoven horizontal strips ⅜ inch thick are spaced one foot apart, this will require less than 250 board feet of lumber for the lattice. Sills, ridge supports, lattice for ends of the structure and frames for doors and windows will add up to a total of slightly over 400 board feet. Insulative concrete to cover this frame, chemicals, emulsified asphalt, doors and windows would make the total cost of the materials required slightly over $200.

For larger buildings, 2 methods of construction are possible. One would consist of poured panels of insulative concrete that are wall thick and that are provided with inserts making them easily joined. The other would use insulative concrete that is formed by machinery into a thin strong board that may be fastened to a standard wood frame as a weather facing.

Willson believes that such precast panels will have even greater value in building the farmer's house. The real obstacle to building good low-cost prefabricated dwellings to date, he points out, is the lack of a satisfactory material for them. Concrete is too heavy, too easily cracked in large wall-thick panels. Builtup panels of lumber, insulation and plywood cost more than, and are not as good as, ordinary construction. But a not-to-heavy, crack-resistant panel can be cheaply poured, using insulative concrete, in a variety of shapes which will combine load-bearing strength and insulation value with moisture and fire resistance.

Insulative concrete has another advantage which should appeal particularly to the busy farmer and his wife who like to see things look right. Its color is "built in" and ranges from white cream and buff to brown and from grey through green, to nearly black. It does not require painting and repainting for protection against the weather. But if change in taste demands another shade, it will hold paint better than standard concrete.

Farm Fire Drills

Condensed from The Dakota Farmer

FIRE drills add greatly to the safety of life and property on the farm, because they teach all who take part how to do three vitally important things—quickly and without panic when fire breaks out; namely: Ensure the safety of persons endangered by the fire; turn in an alarm, and summon other aid; and fight the fire, to extinguish it and hold it in check until help arrives.

The details of the drills will, of course, vary with conditions, but the following suggestions cover many cases. Study your farm and plan what steps should be taken when fire breaks out at various points. Then rehearse these plans, so that everyone on the place will know what to do when any emergency arises.

The chief danger of being trapped by fires lies in the house. Therefore, practice getting everyone out of the house quickly on the assumption that halls and stairs are blocked by flames or smoke. The first drill will emphasize two facts: There should be a safe way of escaping from every bedroom; and infants and invalids should be placed in rooms from which they can be easily rescued from the outside.

Saving livestock is also of great importance. Assume that each building in which animals are housed is on fire, and practice methods of getting them out through various exits.

The telephone, if there is one, will naturally be used under normal circumstances for turning in an alarm and calling up neighbors for help; but it may be cut off by fire. On all isolated farms, therefore, every child old enough for the task should be taught how to go for assistance with the least loss of time.

It is very important that every ablebodied person on the farm know how to use the available fire-extinguishing equipment. Therefore, hold extinguisher drills so that each person learns how the extinguishers are operated. It may even be possible to build small "practice" fires. However, this should be done only where there is no danger of fire spreading to buildings or brush, and on a windless day.

If extinguishers suitable for fires in inflammable liquids are to be used on practice fires, be careful to use them on kerosene— no gasoline—fires.

It is desirable to have someone thoroughly experienced in fire fighting supervise extinguisher drills where practice fires are used.

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Labor Short-Cuts for Pullets on Pasture

Condensed from Everybodys Poultry Magazine

E. I. Robertson

PASTURES pay three dividends in rearing pullets: (1) Less purchased feed, (2) lower feed cost through the use of less expensive feed, and (3) better pullets. Balanced against these dividends is the cost of establishing and maintaining a good pasture and the labor required to care for the pullets. That the advantages far outweigh the disadvantages is shown by the growing popularity of poultry pastures.

Poultrymen have devised a number of labor short-cuts to care for pullets on pasture. When these short-cuts are used, the labor required is not out of proportion to the benefits received. The pullets must be housed in small units, otherwise many of the benefits of range rearing are lost. This decentralization, in order to spread the pullets over the entire area, is the chief cause of the extra labor in growing birds on pasture.

Most of this extra work is getting feed and water to small groups of birds. Some extra work is required in the rotation of equipment which equalizes pasture grazing. Without this equalization, bare spots develop around the houses and feed hoppers, while more remote areas grow too tall. Adequate equipment, applying the extra labor at the right time, and ingenuity have enabled some poultrymen to reduce the labor of caring for pullets on the range.

When pullets are moved to the range when 8 to 10 weeks of age, larger feed hoppers can be used to shorten the feeding operation by reducing the frequency of feeding. Many poultrymen have a schedule of filling the feed hoppers, one, two or three times a week, rather than daily. Such a practice requires covered feeders to prevent loss of feed from heavy or continued rain. Where uncovered range feeders are used, poultrymen usually feed daily. After light showers, pullets are then able to consume the wet mash before any souring occurs.

To prevent bare spots around the feeds, it is necessary to move them to a new location. Usually once a week is sufficient. This is most easily done when the hopper is empty. By moving the feeder away from the house, pullets are encouraged to use

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more of the range area. A few minutes each week devoted to moving feed hoppers will pay dividends in more even use of the pasture and will reduce the bare area around the shelters.

Supplying water for pullets on range may look like a big job where running water is not available. Many poultrymen, however, prefer to haul water to their birds rather than have stationary fountains. While hauling involves some labor, there is no labor spent in laying a pipeline each year. Furthermore, the fountains can be moved when necessary to prevent bare spots.

A large oil drum or barrel equipped with a stand, water pan, and float makes an ideal water fountain. With one fountain for each house of 100 to 125 pullets, filling the barrels once a week is sufficient in most cases. During hot, dry periods, evaporation may require more frequent watering.

If water is supplied in this manner, the fountain can be kept near the house when the chicks are small, but moved farther away as the birds get older. This is another means of encouraging the pullets to use more of the pasture area.

With a movable water fountain, it is possible to regulate the grazing of the pullets by moving the feeders, fountains, and portable shades, keeping the shades between the feeders and the range shelters. In this way, the birds use the entire area rather than just around the brooder house or shelter. All too frequently, feeders and fountains are left near the rearing house all summer. The result is that part of the pasture is worn bare while the grass in other areas goes to seed.

Leaving the house in one spot all season, but moving the other equipment keeps the pullets using all the growing area.

Many poultrymen fail to get their poultry pasture mowed as frequently as they would like. This is especially true early in the season when the chicks are small and the growing conditions are best for the pasture. Best results come from keeping the vegetation immature and short. When the pasture is mowed frequently, it is impractical to collect the clippings for hay or silage because there is not enough volume to rake. Many poultrymen have deplored this loss of highly nutritious feed.

Kenyon Warner in Geneseo, New York, had that experience with his Ladino clover pasture, but he solved his problem. He first tried making hay, but making hay from rank Ladino clover early in the season requires good weather, which he didn't get. He finally burned the dried clippings. The next time the clover needed

mowing he strung an electric fence around his range shelters and brooder houses, moved all feeders and water fountains within this enclosure, and used the remainder of the area for night pasture for his cows. In a few nights, all the excess growth was removed without the labor of mowing. He followed that practice for the remainder of the season.

Growing Profitable Pullets

Condensed from New Jersey Farm and Garden

Charles S. Platt

WITHOUT doubt the growing of healthy, virgorous pullets is the backbone of a successful poultry enterprise devoted to the production of market eggs.

All who have ever attempted to grow pullets recognize this and realize that the best of breeding will not overcome carelessness in the rearing program. The maintenance of health in a flock of young growing pullets at any age is an easily recognized necessity, but the matter of whether or not pullets should be grown at their maximum or retarded in growth is one that has not been studied to any great extent. Just what effect the rate of growth may have upon the vigor and egg production qualities of a mature pullet is a subject that has interested the author for several years and research has been attempted to answer the question.

The first trials were based on a study of the rate of growth of pullets up to the age of 12 weeks, after which they were given identical treatment and kept through a year of egg production. The results of one of the trials are shown in Table 1. From an observation of the data it can be seen that the retarding of growth of pullets prior to the age of 12 weeks had the effect of increasing chick mortality as well as adult mortality and decreasing egg production, all three conditions being unfavorable. There also was a tendency for sexual maturity to be delayed, but this in itself would not necessarily be detrimental. Pullets, therefore, ap-

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parently should not be retarded in their development for at least the first 12 weeks. Following this idea through to practical management, it suggests that as chicks the pullets should receive a diet composed almost entirely of mash, at least for the first six weeks. After that age the protein requirements for even maximum growth are noticeably reduced and grain feeding can be encouraged without fear of causing any great curtailment of growth.

The actual management of the chicks in the experiment cited called for very little grain, and later trials indicated that the use of about one-quarter pound per 100 chicks daily was sufficient during the first week, with an increase of one-quarter pound weekly. On this schedule the chicks should receive one pound daily when four weeks old, 1½ pounds daily when six weeks old. Just how to best feed the pullets after the age of six weeks and until 12 weeks old might still be considered open to experimentation, but the evidence so far accumulated suggests that grain should be restricted to approximately two pounds daily at eight weeks, four pounds at 10 weeks, all on the basis of 100 birds daily. Of course, no grain need be fed at all for the first four or six weeks, but generally a small feeding of grain will be found beneficial.

The second phase of the research undertaken was to see the effect of diets after pullets were 12 weeks old upon their later development and egg production. The results are shown in Table 2. In this instance the retarding of development seemed to be beneficial and similar results were secured in other trials. In other words, while retarding prior to the age of 12 weeks was detrimental, the reverse was true after pullets reached that age. Retarding after pullets are approximately half-grown is easily accomplished either by feeding a low protein mash, that is, one containing less than 14 per cent protein, or by restricting the amount of mash fed if a better quality one is being used. In actual practice there seems to be very little need for more than three pounds of mash daily for pullets on a good grass range after the birds are 12 weeks old. Grain should be fed abundantly, however, the birds being given all they care to eat. The retarding of pullets on range resulted in the production of fewer eggs of the smaller grades, a value not measured in the data given.

In conclusion it seems best to plan on using a mash of the very best quality for baby chicks with the idea of growing them as rapidly as possible until the pullets weigh 1½ to 2 pounds. After that the mash should be balanced

as to vitamins and minerals but may be restricted in protein for the purpose of delaying the onset of egg production. At that, however, it seems best to feed a pullet chiefly on grain with mash very much limited from the age of 12 weeks until the first eggs are laid.

TABLE 1

Effect of Rate of Growth Prior to 12 Weeks of Age Upon Quality of Pullet Reared

Item	Hatch of Mar. 4		Hatch of May 28	
	retarded	normal	retarded	normal
Body weight at	lb	lb	lb	lb
4 weeks	.23	.34	.23	.34
8 weeks	.81	.98	.61	.86
12 weeks	1.45	1.72	1.14	1.37
24 weeks	2.90	3.14	2.85	3.08
36 weeks	4.10	3.98	3.74	3.67
	days	days	days	days
Age at first egg	210	188	207	201
	%	%	%	%
Chick mortality	21.2	6.4	10.8	6.9
Adult mortality	20.6	14.4	35.2	28.3
Egg production	52.4	54.3	44.3	50.9

TABLE 2

Effect of Rate of Growth After 12 Weeks of Age Upon Quality of Pullet Reared

Item	Hatch of March 4	
	retarded	normal
Body	11.47% protein	21.03% protein
weight at	mash	mash
12 weeks	1.63 lb	1.65 lb
16 weeks	2.05 lb	2.12 lb
20 weeks	2.36 lb	2.53 lb
26 weeks	3.00 lb	3.18 lb
Age at first egg	210 days	202 days
Range mortality	3.9%	11.8%
Adult mortality	20.8%	20.0%
Egg production	48.5%	44.9%

Influence of Thyroprotein on Milk and Milk Fat Production

Condensed from Holstein-Friesian World

Ralph P. Reece

New Jersey Agricultural Experiment Station

I SHOULD like to review briefly the nutritional factors which affect the composition of milk. Dairymen have known for many years that the amount and composition of the ration fed the dairy cow influence the yield of milk. One might expect that certain feeds would alter the composition of milk. In the case of a few milk constituents this is true, in other cases little or no effect has been observed.

The vitamins: The vitamin A content of milk is dependent upon the amount of carotene, a yellow pigment, in the feed. Vitamin B1 is formed in the cow's paunch by bacterial action and recent studies indicate that the kind or quality of feed has no measurable effect on the vitamin B1 content of milk. The amount of vitamin C in a cow's ration has little if any influence on the vitamin C content of the milk produced. The vitamin D content of milk depends upon the vitamin D content of the ration and the amount of this vitamin in milk can be increased greatly by feeding irradiated yeast. However, this is an inefficient way of increasing the vitamin D content of milk. Milk is a good source of vitamin B2, which is identified with the yellow pigment of milk whey (riboflavin) and feeds such as pasture grass and properly cured leguminous hays increase the amount of this vitamin present in milk.

Milk fat: While the fat in milk can be formed by the cow from feed constituents other than fat, yet for highest production it has been found desirable to feed sufficient fat to equal the fat in milk. This would usually amount to 5 or 6 per cent of the grain mixture. At the present time there is no practical way of increasing the percentage of fat in the milk by the type of ration fed.

Protein: The feeding of rations high and low in protein indicates that the protein level of a ration has very little, if any, influence on the composition of the milk produced. If the ration is suffi-

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ciently unbalanced to seriously decrease milk yield, then the fat content may increase slightly. Recent experimental work indicates no advantages to be gained by feeding protein in excess of the protein requirements.

Mineral matter: Mineral feeding, with the exception of iodine, does not sufficiently increase the minerals in milk to be of any practical importance.

The importance of watery or succulent feeds in the dairy ration has been stressed for a number of years. While succulent feeds may increase the palatability of the ration, the feeding of a ration containing a large quantity of water neither increases the percentage of water in milk nor decreases the percentage of fat. Heavily lactating cows require an abundance of water, but this can be furnished by drinking water.

Studies at the Missouri State indicate that an abundant well-balanced ration has a tendency to maintain the constancy of the composition of milk. The reduction of the ration below the normal level causes a lowering of milk yield and an increase in fat percentage. After a short time the fat percentage tends to return to normal.

Rapid changes should not be made in the dairy ration. After an abrupt change in the ration there is a general tendency for the fat to become abnormal and the usual change is a slight decrease in milk yield and a slight increase in fat percentage.

It is advisable indeed to have cows in a good physical condition at calving time. The reserve flesh aids in starting lactation at a high level and in maintaining persistent production. The test is always higher for a time after calving and results in a slightly higher test for the year. For example: White and Eckles showed that a Holstein-Friesian cow calving in a very fat condition averaged 3.3 percent fat for the year. The same cow in normal condition averaged 3.1 percent fat for the year. The first two monthly tests tend to be considerably higher than any others until after the seventh month of the lactation is passed. If the cow is in thin condition, however, she will start low in test and gradually increase from month to month, the sharp advance coming near the end of the lactation period. If you are buying a cow shortly after calving and carrying reserve flesh, do not judge her fat test over a lactation period by her fat test at that time.

Following the turning of cows on pasture the fat percentage of the milk usually increases for a week or two. After several weeks on pasture, the composition of milk returns to normal or may

even go a little below normal for a time.

It is a well-recognized fact that cows produce milk with a lower butterfat test during the summer months than during any other part of the year. There are probably some dairymen in New Jersey who find it difficult to maintain a satisfactory herd test during the summer months. Dairymen can maintain a more uniform herd test throughout the year if they will have their low-testing cows calve in September. Under such a system the low-testing cows will be dry during July and August, allowing the higher-testing cows to produce the milk supply in the summer. If such a system can not be followed at least plan to have your low-testing cows well-advanced in lactation during July and August.

Thyroprotein is a hormone, a hormone being a substance formed in certain glands of the body and poured directly into the body. Usually the hormone stimulates only definite parts of the body. Insulin, the lack of which causes diabetes, is the hormone with which you are probably most familiar. This hormone enables the body to utilize sugars. You are all familiar with the thyroid gland. When iodine is lacking in the diet the thyroid gland becomes large and forms a goiter, a condition rather common in the Great Lakes region a number of years ago. The thyroid gland makes a hormone called thyroxine. Thyroxine increases bodily activities and it is sometimes taken to decrease body weight.

In 1934 Graham showed that the feeding of dried thyroid glands to cows past their peak of production increased milk production and particularily milk fat production. He later identified the active principle as thyroxine. These findings were confirmed by other workers and, although they showed the profound influence of thyroxine on milk and milk fat production, they offered no practical application because of the cost of the hormone. Reineke and Turner then developed a product whose action is similar to that of thyroxine. They did this by chemically combining iodine and casein. This product is called thyroprotein.

We began our work with thyroprotein in August 1942. We wanted to answer the question, will a moderate amount of thyroprotein significantly increase the percentage of fat in the milk. Five cows were selected for the experiment and their average fat test during a two-week control period was 3.6. Ten grams of thyroprotein were then fed daily for three weeks. The average fat test increased to 4.2 and two

weeks after the withdrawal of thyroprotein from the grain ration the fat test was 3.7. This was pretty good evidence that thyroprotein would increase the fat test when fed over a short period of time. We then began work to determine the influence of thyroprotein when fed over a long period of time.

Thyroprotein was fed to a cow for 7 months of a lactation period. She produced 1,400 lbs. more of milk than she had in her previous lactation. About 1,000 lbs. of the 1,400 lbs. increase could be attributed to the feeding of thyroprotein, the remainder of the increase being attributed to greater maturity.

Another cow, a Brown Swiss, received 10 grams of thyroprotein daily. This cow was just past her peak production when the feeding was begun and in the fifth month of the feeding trial she produced just as much fat as she had produced when at her peak production. This doesn't mean that her milk production remained at the same level. It didn't, but her fat test increased sufficiently to off-set the decrease in milk production. She produced 16,936 pounds of milk and 646 pounds of butterfat in 305 days. In her subsequent lactation, when thyroprotein was not fed, she produced 12,369 pounds of milk and 492 pounds of butterfat. This is a difference of 4,500 pounds of milk and 154 pounds of butterfat in favor of the lactation period when thyroprotein was fed.

Another cow had declined rather sharply in milk production in the sixth month of her lactation. She was producing 16 pounds of milk on twice-a-day milking. She was then fed 15 grams of thyroprotein daily and her milk production increased to 22 pounds per day. During the three month feeding period she produced more milk than she had in the three months prior to the feeding trial. The milk also had a higher fat content. This cow was a Brown Swiss and they are slow maturing animals and this reflects in the amount of milk they produce during their first lactation period. To put it another way, cows tend to give more milk in each successive lactation until they attain their mature body weights. In her first lactation, Cow No. 628 produced 5,180 pounds of milk and 252 pounds of butterfat. In her second lactation period, during which time thyroprotein was not fed, 628 produced 5,160 pounds of milk and 243 pounds of butterfat. Consequently 628's second lactation was not an improvement over her first lactation, she having been fed thyroprotein during her first lactation period.

One cow, 611, received thyroprotein daily for 16 months and

eight months after the feeding began 611 was producing just as much fat per day as she produced during the month prior to the feeding trial. Eight additional cows received thyroprotein daily for 3 to 8 months. Four cows were started on thyroprotein in October. Increases in milk production varied from 6 to 19 percent. No harmful effect has been noted to date from the feeding of thyroprotein to dairy cows. Cows have become pregnant during such feeding periods and have given birth to perfectly normal calves following such feeding periods.

These results are encouraging and it is my belief that the feeding of thyroprotein to certain cows will cause them to produce more milk than they would have otherwise. One must not conclude, however, that if a little thyroprotein is a good thing, more thyroprotein will be a better thing. Excessive amounts of thyroprotein result in severe losses in body weight and of course this is undesirable. This is why we have fed thyroprotein in moderate amounts.

How does thyroprotein work? One might say that it puts lazy cows to work. It makes the heart beat faster, the blood flows faster and as a result more energy is available to the udder. The cells in the udder that make milk work at a more rapid rate and they are able to remove more blood sugar and blood fat from the blood. The cow that increased from 16 pounds to 22 pounds per day was carrying considerable flesh. She was a lazy cow and as a result she wasn't utilizing her feed for milk production, she was putting it on her back. The thyroprotein caused this cow to utilize her excess flesh for milk production and there is nothing wrong with that.

Where can you buy thyroprotein? You can't. It cannot be sold at the present time. It is listed as a "new drug" by the Food and Drug Administration and they will keep it on that list until they are convinced that the thyroprotein which is fed is not secreted in the milk. We are now cooperating with the Post Graduate Hospital in New York City on an investigation which I am certain will demonstrate that thyroprotein is not present in the milk.

Eventually, I believe, thyroprotein will be available in a grain mixture. The Chas. M. Cox Company have shown that small quantities of thyroprotein can be mixed uniformly in a grain mixture. In addition we have cooperated with the Cox Company on a study which showed that thyroprotein in a grain mixture remained uniformly distributed in transit.

At the Purebred Dairy Cattle Association meeting last February, Professor Herman suggested

careful consideration of several items when speaking on the subject of feeding thyroid material to cows on test. I should like to make several comments on Herman's talk. If sufficient thyroprotein is incorporated in a dairy ration so that it is stimulating milk production it can be detected. We have fed thyroprotein during every month of the year and I see no reason why it cannot be fed under year-around feeding conditions. Secretary Norton commented on Herman's talk. Secretary Norton said that if improper functioning or inactivity of the thyroid is an inherited characteristic surely the use of thyroprotein or similar substances should be barred, if possible, as all basis of comparison would be destroyed and sire and brood cow proving data would be of no value. I believe that the thyroid activity of an animal is an inherited characteristic and appreciate the problems imposed by the feeding of thyroprotein to dairy cattle. I do not, however, agree with those who say that thyroprotein should not be made available to dairy farmers for fear that records will be made under unfair conditions. The reliability of records of an association depends upon the honesty of its membership. If a breeder would use thyroprotein to make an unfair record he is probably doing other things at the present time that are unfair. As time goes on I believe that we shall make more and more use of the first lactation records to prove bulls and cows. Therefore those who are doing official testing should keep thyroprotein out of the ration of first lactation heifers so that such records will be available for proved sire and dam data.

Editor's Note:

We asked Prof. Reece for his opinion as to the practicability of incorporating thyroprotein in commercial dairy rations at such time as it become available at a price to make it profitable to use. We also asked his opinion as to its effect upon the lifetime production of a cow if used continuously. His answers, supplementary to his paper will be of special interest.

"In reply to your letter, I should like to say that I believe that it would be practical to include thyroprotein, when it becomes commercially available, in a dairy grain mixture. By this I mean that when thyroprotein is available it should be available in a grain mixture. I do not think that each and every dairy cow should be fed thyroprotein. Efficient milk and milk fat producers should not be fed thyroprotein. In other words, good dairy cows do not need thyroprotein. Its main use should be

in cows that gain in body weight at the expense of milk production. It may have real value in low testing cows in order to increase the fat test. These low testing cows will have to receive additional quantities of total digestible nutrients since the test may not remain up unless increased feed consumption prevents severe losses in body weight. Before using thyroprotein in a dairy herd one should know his cows and feed them on an individual basis, more so than has been the usual practice. It would be a mistake to feed all of the cows of a herd thyroprotein; it must be an individual proposition.

Experimental work does not permit me to give an answer to your question on the effect of thyroprotein on the life-time production of a dairy cow. I do believe that feeding thyroprotein, say for ten consecutive years, may shorten the life of a cow, but she should produce just as much milk and if she does that means more profit to the farmer since he has to spend less for maintenance. We are much interested in the life-time production of dairy cows because that is the yard-stick which should be used in evaluating dairy cows. In our fluid milk areas, however, not many cows remain in our dairy herds until they reach a ripe old age. Disease is the main factor that makes it necessary to sell many cows when they are still at an age at which they can produce milk efficiently. I feel, therefore, that until the time comes when our disease control measures make it possible for cows to remain in the herd as long as they are profitable producers that we are justified in getting every pound of milk possible out of a cow before she goes to the butcher.

I have the feeling that one of our breeds of dairy cows needs thyroprotein, that is, I think that they are hypothyroid. I may someday be able to prove or disprove this contention.

I am sure that I have not answered your questions very well. I feel very strongly about the possibilities of thyroprotein, but it must remain an individual proposition, that is, some cows should receive it, others should not."

Tomato Pollenization

Condensed from Texas Farming and Citriculture

THE dropping of tomato blossoms, which often gives growers much concern, is the subject of a recent discussion by J. E. Knott of the Division of Truck Crops, University of California. Some of his observations follow:

There is very little cross-pollination of tomato flowers. Several kinds of wild bees are the only insects known to transfer pollen from one flower to another. When the flower opens the pollen is released inside the cone and drifts down to the end where part of it is caught by the sticky stigma. The flower is thereby self-pollinated. If the air is hot and dry the pistil may grow too rapidly before the pollen is released, reducing the chances of the pollen being caught. Coupled with this is the drying of the stigmatic surface when it is thus exposed to hot dry winds so the pollen is not caught, especially in varieties which have a rather dry surface anyway. One variety with a little different habit of flower development might set fruit while on another nearby the blossoms would drop. The development of the blossoms on a given variety will differ at various times of the season.

During short days or low light intensity, especially with heavy applications of nitrogen, the evidence indicates that the length of the pistils will be greater with consequent reduced chances of pollination. Along with this the flowers may be smaller because of less manufacture of carbohydrates in the leaves.

It is natural for the first and sometimes the second bloom cluster on certain varieties to turn yellow and drop off before they even open. Even if these flowers developed and were pollinated it is doubtful if they would set fruit. This is presumably because of the growth relationships within the plant.

There is a lag of several days before the effect of unfavorable temperature is shown by the dropping of blossoms. Besides the influence mentioned above of temperature on the excessive elongation of the pistil, there are several other ways in which it can be responsible for blossom drop.

Pollen does not germinate for several hours after it lands on the stigma. Experiments under constant temperatures have shown it germinates best at 70 degrees and 85 degrees F., much less well at

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50 degrees F., and very poorly at 100 degrees. The maximum rate of pollen tube growth was at 70 degrees with slower growth at 85 degrees, 50 degrees and 100 degrees F. in that order. It took 50 hours or more at the most favorable temperatures before the pollen tube grew down far enough to fertilize the egg. The range in day and night temperatures we get in California might lengthen this considerably.

It is obvious that a lot of things may happen then before the little tomato starts to develop. Hot dry winds may dry up the pistil before the pollen tube has grown far enough to cause fertilization. The pollen may not germinate even if it does land where it should. Thrips, if numerous, might injure the inside of the anthers so that they would not open and release pollen, or injure the pistil so that it would dry prematurely.

It is apparent from the above discussion that there is little that growers can do to counteract these causes of blossom drop. Good, well grown plants, adequately supplied with water, will set fruit, weather permitting. Sometimes it is fortunate that the first cluster of blossoms does not set fruit. A heavy, early set on some varieties would check the growth of the plant, cut down total yield, and produce an open vine with consequent later increase in sunscald.

Prevent White Scours

Contagious diarrhea, commonly known as white scours, in newborn dairy calves has been prevented and also treated successfully by research workers at the South Carolina Agricultural Experiment Station. Here is the way scours have been prevented at the South Carolina institution: Two-gram doses of sulfaguanidine were given two hours after birth, again six to eight hours later, then night and morning through the second and third day.

Although prevention was found to be more satisfactory than treatment, the Southern research workers recommend that in the event of an outbreak of scours all feeding be withheld for 24 hours and the affected calves given liberal amounts of warm water. They suggest that sick calves be given a first dose of sulfaguanidine at the rate of seven grams per 100 pounds body weight. A second dose of five grams for every 100 pounds body weight should be given four to six hours later and the dose then reduced to four grams per 100 pounds body weight given at four-to-six-hour intervals until recovery occurs.

—Shorthorn World

Social Security for Farmers

Condensed from Land Policy Review

Arthur J. Altmeyer

The Chairman of the Board

FARMERS are generally familiar with insurance. They have proved to be good "prospects" for a wide variety of insurance protection against the natural hazards of agriculture. They have insured buildings, equipment, crops, and workstock against loss by fire, hazards of weather and insects, theft, and accidental damage.

Thus far, however, farmers have generally not utilized the insurance principle to safeguard their most valuable single asset—their own earning power. Farmers are not adequately covered by life insurance and few carry health and accident insurance.

According to a nation-wide study of consumer incomes and expenditures, only about 38 percent of white nonrelief farm families having net incomes below $1,500 in 1935-36 carried any life insurance. The average yearly payment for such insurance was only $64.62 per family with insurance. Even when all income classes were included, the percentage of white nonrelief farm families with insurance was only 43.3, and the average expenditure per family only $87.69. Among white nonrelief families living in small cities and villages, the percentage of those with incomes below $1,500 carrying life insurance was 61. The average annual premium paid was $63.21 per family with insurance, or a little less than for insured farm families. When all incomes classes were taken together, more than 70 percent of urban families were protected by life insurance, and the average family spent $111.55 a year for life insurance premiums.

There are several possible reasons for the lack of private life, health, and accident insurance among farmers. A reasonably adequate amount of such insurance would absorb a relatively high proportion of the average farmer's cash income. The best time to purchase life insurance is during one's early working life. But this is precisely the time when the financial burdens of the young farm operator are particularly heavy and he is usually then seeking to accumulate the

Reprinted from the Land Policy Review, Washington, D. C., Spring, 1945

money to buy a farm, his equipment, livestock, to pay off his mortgage, and to put his farm generally on a stable financial footing. When this period of stringency is over, a farmer may be too old to get life insurance on advantageous terms.

Even when he is not pressed for money by the needs of his farm and his family, a farmer hesitates to buy private life insurance because his income is uncertain. A year or two of poor crops or unfavorable prices, or other emergency, may make it difficult, if not impossible, for him to pay the premiums on a policy of any considerable size. Fear that his policy may lapse thus deters him from securing any life insurance protection, or means that he takes out only inadequate protection against premature death or loss of earning power through old age or permanent disability.

One form of insurance protection against these risks is still unfamiliar to the great majority of farmers. Except in broad outlines, it is not well understood even by many agricultural leaders. This is insurance under the old-age and survivors insurance program provided by the Social Security Act.

The program is operated by the Federal Government, and it now covers some 50-odd million industrial and commercial employees. It is paying monthly benefits to about a million persons, including nearly 500,000 aged retired workers, 117,000 wives of such workers, 250,000 children of retired or deceased workers, 130,000 widows, and 4,000 aged dependent parents of deceased workers.

Workers in jobs covered by the old-age and survivors insurance program pay contributions of 1 percent of their wages up to $3,000 a year. Employers in the program make contributions of 1 percent of the wages they pay their workers. When a worker dies or reaches retirement age, he or his survivors may apply for the benefits provided by the law. Monthly benefits are computed on the basis of the worker's average monthly wages in covered employment and on the number of years during which he participated in it. No inquiry is made into the family's assets or income. The "primary benefit" of the worker is computed by taking 40 percent of the first $50 of his average monthly wages, plus 10 percent of the remainder, and increasing this amount by 1 percent for each year in which he earned $200 or more in covered employment.

Benefits to survivors are figured at specified percentages of the worker's primary benefit (75 percent for a widow, 50 percent for a wife, child, or dependent parent) but the total benefit may

not exceed $85 per month or twice the worker's primary benefit, whichever is lower.

All persons are compulsorily covered by the old-age and survivors insurance program when they are employed at industrial or commercial jobs in the continental United States, Alaska, and Hawaii. Agricultural labor is among the several major types of employment still excluded and earnings from a farm or an independent trade, business, or profession, are not yet covered.

Only recently have farmers become aware of this program as a possible source of security for themselves. They have had little occasion to become familiar with it, as relatively few had taken out "Social Security cards" or worked in employment it covers. For example, only about 32 percent of the farmers in Arkansas and 8 per cent of those in Iowa had acquired "Social Security cards" by the spring of 1941, according to a sample study made by the Bureau of Old-Age and Survivors Insurance and the Farm Security Administration. Only 18 percent in Arkansas and 6 percent in Iowa had any earnings credited to their social security wage records by the end of 1940.

Since that time the situation has changed materially. Thousands of farmers have found temporary nearby employment. Other thousands have left their farms with fathers, sons, wives, or tenants, and have gone to cities to work in war plants. Farm laborers and farmers' sons and daughters have gone into industry at high wartime wages. Farm people have thus become acquainted with the old-age and survivors insurance program through actual participation. Many have paid sizable contributions and acquired rights under it, which will diminish or disappear if they return to peacetime work on the farm.

Farmers are thinking seriously about post-war problems of agriculture. They fear a return to the low level of farm prices and the accompanying drop in farm land values similar to that which occurred after the last war, when farm prices fell 66 percent in a single year and when 400,000 farmers lost their land by foreclosure. They recall the long period of agricultural distress that began before the last great depression. They know that hundreds of thousands of farm boys now in the armed services will want farms of their own after the war. Some older farmers plan to retire and make a place for their sons. Others cannot so long as their future is insecure; this group particularly realizes that, if they could have been a participant in this insurance program since it began to operate in 1937,

they might be able to stop active work after the war.

Farmers of all ages need insurance against the possibility that their death or disablement will leave their families without adequate income. Their plans for meeting the other uncertainties of the post-war future would rest on a better foundation if the low-cost protection of the old-age and survivors insurance program were available to them.

Farmers face another hazard that could well be but is not yet covered by the national insurance program—the cost of family medical and hospital care. The experience of the Farm Security Administration with prepaid medical care has shown that this kind of insurance protection can considerably improve the medical and hospital services available to rural families. Farm people find it so difficult to pay for these services out of their own earnings that rural medical and hospital care is still, in most sections, far below the standards in urban areas, both in quality of service and in the amount of service available.

Insurance against the risk of permanent disablement before retirement age is not yet provided under the old-age and survivors insurance program. But it is an insurable risk to which farmers are peculiarly exposed. Studies by the National Safety Council reveal that farm work is one of the most hazardous of all occupations. But a farmer is not protected by workmen's compensation laws, and must himself pay for medical and hospital treatment when he is injured at work and the loss of earning power is added to this expense.

Hired farm hands need insurance against the same hazards. In addition, they are faced with the risk of involuntary unemployment. In every State the industrial and commercial employee now enjoys protection under an unemployment insurance program operated by the State in co-operation with the Federal Government, but only in the District of Columbia is the farm worker eligible for unemployment benefits. All other jurisdictions specifically exclude "agricultural labor" from them.

These lacks tend to keep competent workers out of the agricultural labor market. Workers who have left the farm for wartime industrial jobs are likely to remain in such work after the war if they can, so as to keep the security rights they have built up. Were the same sort of insurance protection extended to paid farm work, farmers would find it easier to compete with industry in hiring competent workers now and after the war.

Farmers pay many kinds of State, county, and local taxes. In

rural States, the greater part of the taxes are paid by farmers. Much of this revenue goes to pay for relief to aged, incapacitated, or dispossessed farmers and unemployed, aged, or disabled farm workers. If some of these needs were covered by social insurance, their cost would be distributed among the entire population in proportion to their earnings, and would not fall so heavily upon the members of rural communities.

Employers who are subject to the program now file quarterly pay-roll reports showing the name, Social Security account number, and amount earned by each of their covered employees. The Social Security Board credits the wage record of each worker with the wages reported for him, and uses these records to determine the worker's insurance rights and the benefits payable to him or his survivors.

During the 8 years in which only industrial and commercial employees have been covered, experience has been gained and ways have been discovered for solving the administrative problems of bringing farmers into the program. Farmers are now generally accustomed to making reports to the Government, for income-taxes for instance. With very little change, the same reports could be used as a basis for figuring the farmer's social security contribution. For farmers who do not file income-tax returns, a simple method of estimating income has been devised. This is called the value-of-services method. A value is set on the farmer's own services equal to what he would have to pay a hired worker to replace himself. A farmer might consider his own services to his farm to be at least equal in value to those of his highest paid hand. A farmer who hires no labor could value his services according to the current wage rates for good farm hands in his locality, using the monthly rates published by the Department of Agriculture as a guide.

For farm workers, the method of collecting wage reports and contributions would vary according to the numbers and types of workers hired. Large units hiring 10 or more persons probably keep accurate pay-roll records already, and they could use the quarterly pay-roll-reporting plan without difficulty, at least for their regular hands. Smaller farming enterprises might prefer to use a stamp plan which requires no bookkeeping. Special wage stamps would be bought by employing farmers, who would place them in stamp books carried by their workers whenever wages were paid. Half of the cost of the stamps would be deducted from the worker's cash wage, and the wages indicated by the stamps in his book would be

credited to the worker's social security account along with his other wages or income from farming.

Thus, farmers could get full credit in their social security records for work on their own farms, paid work on other farms, and for seasonal work in industrial or commercial jobs. Their participation as workers, as employers of labor, and as independent working farmers would involve a very minimum of inconvenience to them.

Because the present program has been in operation for about 8 years, farmers and farm workers without previous coverage would suffer a serious handicap if they came in now and eligibility conditions and the method of figuring benefit rates remained unchanged. In general, the solution would be to disregard, in determining eligibility to benefits and computing benefits rates, the period before the coverage extension during which the worker was not in covered employment, but to give full credit for any covered employment and earnings he had before coverage was extended. In this way, there would not be any loss of insurance rights already acquired by farm people through wartime industrial work or through seasonal work in canning factories, logging enterprises, and other covered jobs.

Ways have been worked out also for determining insurance rights in terms of years of participation, as an alternative to the present quarterly method, which is not well adapted to the annual cycle of farming.

Similarly, alternative methods of making contribution payments have been developed for different kinds of farmers. Those who receive most of their income from the sale of a single crop could make their payments annually. Those who have a rather steady year-around income from the sale of poultry, eggs, dairy products, could pay on a quarterly basis, and if they wish could use special contribution stamps to spread the cost evenly over the quarter.

Benefits under the program now cost employers and employees a total of 2 percent of wages. This rate was originally scheduled to rise stepwise to a maximum of 6 percent in 1949, but the first scheduled increase has been postponed four times by Congressional action. Protection for their workers against unemployment now costs employers a maximum of 3 percent of wages paid.

The Social Security Board believes that if a comprehensive program is adopted covering the entire population, the maximum rates of contribution to be paid by employers and employees

should not exceed 6 percent each. If the cost at some future date rises above this figure, the Board believes it should be met through general taxation, since the cost of public assistance would be so much less. Such a comprehensive program would provide protection against old-age, premature death, permanent disability, temporary disability and the costs of adequate medical and hospital care. The Board believes that the cost of protection for farmers themselves against all of these hazards, except temporary disability and unemployment, would not exceed 7 percent of farmers' annual incomes. This cost would be largely offset by reduced expenditures for medical care and hospitalization and by reduced taxes for local relief of all kinds.

Sphagnum Moss Seed Flat Technique

Some months ago a seed flat technique was developed by Dr. S. H. Cameron, ULCA.

Dr. Cameron's method is to cover the earth of the conventional seed flat with about ¼ in. of finely sieved sphagnum moss. Seeds are shaken on the moss, watered and otherwise handled as usual until germination is complete. As plant rootlets push down through the moss, they are fed with a nutrient solution of a teaspoonful each superphosphate and a commercial nitrate per gallon of water.

A variant of this method, used at the Rancho Santa Ana Botanic Gardens in Orange County, is to sprinkle the seeds on a layer of several inches of the whole moss. A nutrient solution is used to grow the plants to the replanting stage, and seeding is thin enough to permit this growth.

Advantages claimed are ready germination (as with Dr. Cameron's method) and convenience and economy in handling the entire plant mass from flat to field, even including shipment.

Another advantage in use of the sphagnum is prevention of damping-off. When the moss is used, damping-off fungi do not propagate readily in the mildly acid moss and when they do, are mechanically held by it from spreading. In conventional seed flat practice, young fungi migrate by swimming from one moist soil particle to the other. Such movement is apparently held to a minimum in the moss.

This Problem of Inheritance

Condensed from The Shorthorn World

Professor L. M. Winters
The University of Minnesota

DURING recent years interest has increased markedly in the problems of inheritance in our farm animals. As our information has increased, we have become aware that the inheritance of this or that particular trait or character is not due to accident, but due to the definite unfolding of a pattern laid down at the time of fertilization.

To understand this chain of events, whereby the calf inherits from its two parents we need to go back to the mechanism by which the calf came into being. Each individual is the result of the union of two very tiny germ cells: one produced by the dam and the other by the sire. Each of these germ cells contains a definite number of small structures known as chromosomes—we can visualize them as rods. And on, or in, these rods we have what are known as genes—we can think of them as beads on a string. Each of these genes or beads contains the somethings that are responsible for the calf being red or white, big or small, polled or horned, etc. It is the genes on the chromosomes that are responsible for the unfolding of characters according to a definite pattern and this pattern is determined at the time of fertilization. Both parents contribute equally, or nearly so, to this whole gene total. In other words, for every gene contributed by the dam, a mate is contributed by the sire. If the sire contributes a gene for horns the dam contributes a mate; her gene may be the same as that from the sire or it may be different—polled.

Some cattle are polled and others are horned. We will assume that we are mating an animal pure for horns with one pure for polled. The offispring is polled. The reason being that the horned parent contributed a gene for horns and the polled parent contributed a gene for polled but the polled character dominates the situation (it is known as a dominant) and thereby covers up the expression of the gene for horns. The gene for horns is still there and is just as pure as ever. When this animal, produced from parents one polled and one horned, produces germ cells it

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will produce one carrying a gene for polled and one for horned. It thereby develops that if a large number of matings are made between individuals produced by polled and horned parents 3 out of 4 will be polled and 1 out of 4 will be horned. The horned individual is just as pure for horns as the original horned stock and on the average 1 of the 3 polled parents will be pure for polled. An animal may, therefore, be polled and yet fail to breed true for the polled character.

The above explains why in some of the newer strains of polled cattle an occasional horned one appears. It also explains, in part at least, why outstanding individuals often do not breed as well as they look.

In Shorthorn color we encounter a different situation. Shorthorns may be red or white or a combination of red and white. For the time being we will leave spotting out of the picture. Let us assume that we mate a red animal with a white one. The red animal produces a germ cell which carries a gene for red, and the white one produces a germ cell which carries a gene for white. Neither red nor white is dominant; the result is the calf is roan. When the roan calf produces germ cells, it will, however, produces germ cells one half of which carry genes for red and the other half carry genes for white. The result is that roan mated to roan will produce, on the average, 1 red: 2 roans: 1 white. It is impossible to develop a herd that will breed pure for roan, but herds can be developed that are pure for red or white.

When reds are mated to reds the offspring are red and when whites are mated to whites the offspring are white. Roan mated to red produces, on the average, I roan to 1 red. The reason for this is that whereas the red produces germ cells all of which carry red, the roan produces one germ cell for white for every germ cell it produces that carries red. Thus when the germ cell carrying white mates with the germ cell from the red animal the offspring is roan. Roan mated to white behaves essentially as roan mated to red. The roan animal produces two kinds of germ cells with respect to color: one for red and one for white. The white animal produces only one kind—the kind for white. When the roan animal's germ cell carrying the gene for red meets with one from the white parent the offspring is roan. Thus on the average roan mated to white will yield roans and whites in about equal numbers.

All of the above frequently falls down if examined too critically with small numbers. The chief reason is that all this de-

pends on chance and chance does not always divide equally, especially in small numbers. This can be tested easily by tossing a coin 10 times and recording the heads and tails. On the average heads will come up 5 times and tails 5 times, but due to chance this will not always occur, in fact it is possible to get 10 heads or 10 tails in a row. In 100 tosses, however, the division will be remarkably close to 50-50.

Another reason why the above may fall down on examination is that we seldom find animals that are completely red or completely white. We classify them as red or as white, but in most cases the classification while satisfactory for the job is not entirely accurate.

Rather broad interpretation can be made from the above explanation of color that are much more far reaching than the inheritance of color. Roan is an attractive color, many people like roan. But we can select and breed for roan until doomsday and never develop a herd that is pure for roan. Roan is the result of what is known as a heterozygous condition. In other words the roan animal lacks genetic purity for that character. It simply means there are limitations in what can be accomplished by selection. Roan is not the only desirable character that is produced by a heterozygous or impure state. If we desire a whole crop of roan calves the way to produce them is to mate a white bull with red cows or reverse the procedure. In like manner many other highly desirable traits are produced by a heterozygous condition and our job as breeders is to gain and exercise control over these conditions. Too often we have assumed that purity was synonymous with ultimate desirability. This is not the case, genetic purity is usually only a means toward an end and the most highly desired end trait may well be one that is produced by a heterozygous condition—lack of purity. In this case genetic purity is of value in that it makes it possible for the breeder to put known qualities together with definite known results.

Spotting introduces another complication in Shorthorn color; it is inherited independently from roan. The gene for spots is recessive to the factor for full color. Thus when a *full* colored animal, pure for color, is mated to a spotted one, the offspring is full colored, but it is not pure for full color and hence does not breed true. It producers two types of germ cells with respect to spotting, one for spots and one for full color.

In interpreting the above to particular herds, the reader needs to keep in mind that full color is a dominant trait hence a full

colored animal may not breed true. In like manner he needs to keep in mind that a white animal can carry genes for spots but it, of course, is not spotted because it lacks the something necessary for color. In must also be kept in mind that many, in fact most, animals called red or called white are not completely red or white.

The Shorthorn breeders of today are very fortunate in that the founders of their breed did not tie their breed down to a narrow color pattern. The wider range of colors allows breeders more latitude in working for the improvement of the breed in the more worth while characters which in the long run make or break a breed. In the long run a breed is made or broken on the basis of its ability to produce—its productivity. There are five major factors that affect total productivity; they are (1) the ability to reproduce regularly, (2) the ability to survive, (3) the ability to grow rapidly, (4) the ability to gain weight economically and (5) the possession of a body form that satisfies market requirements.

More and more we are beginning to realize that these are the traits a breed must possess in order to gain and maintain favor with commercial producers. If each of the five mentioned traits is inherited independently and we wish to select an animal that is above the average in each of the five traits then only 1 out of 32 animals could qualify. Fortunately it appears that there is a certain amount of overlapping in some of these traits. But we mustn't get too enthusiastic about this overlapping, because it also appears not to be as great as was formerly thought. The man that still believes he can tell by looking at an animal how fertile it is, how much resistance it possesses and how fast and economically it will gain is in for many disappointments—provided of course he keeps an accurate diary of his predictions and the results. On the other hand, it is very easy to have a remarkable record if one remembers only his correct predictions. Nevertheless, there is some overlapping and it may be rather high between some of the desired traits.

Another complicating factor is that these traits are not inherited by the comparatively simple fashion outlined for horns and color. More genes appear to be involved—in some cases it appears that many genes are involved. This makes an analysis of the genetics of the problem quite difficult—in fact impossible without very large numbers. For this reason most modern professional animal breeders are turning to another method of attack. This method of attack cen-

ters on the development of definite lines which will possess rather definite known quantities of these economic traits. This is accomplished by inbreeding, or, for those that dislike the term inbreeding, linebreeding. These breeders are looking forward to the time when these lines can be crossed. It has already been demonstrated that many, not all, of the lines developed in this way will cross to advantage but what is even more important they will cross with quite definite results. In other words, we thereby obtain more definite and certain results than have been obtained by past generally used methods.

Still a further complicating factor is that the heritability of most of these traits is much lower than most of us assumed at the outset. When we set out to select for a high rate of gain or a given economy of production or fertility and we select the individuals that are high in these respects, we do not get all that we have reached for. The reason for this is that other factors besides inheritance affect an animal's development. Even under the most carefully controlled conditions we are not able to gain more than about a 40 percent of what we are selecting for. And in some traits we gain only about a 15 percent control.

The point involved here is that inheritance merely sets the stage for an animal's future development. Inheritance furnishes no guarantee that the animal will develop up to a certain standard. Inheritance does make it possible for an animal to develop to a certain standard, but feed, care, climate, freedom from disease and apparently a hundred and one other things that we know little about enter in and determine whether the animal is to develop up to its possibilities as determined by inheritance.

On first thought the above may appear discouraging regarding what can be accomplished through breeding. When we look at things a little more carefully it is not so bad and actually fits in with our observations of how great herds have been developed. Great herds have not been developed over night or in a couple of years. They have been developed through several generations (usually five or six) of careful breeding toward certain ideals —both bulls and females being selected carefully toward a given end. The men who have built great herds know that they did not accomplish all this with the first round of selection; it is encouraging that the best in practice and the modern science of animal breeding agree so perfectly.

Plants Vary Widely in Mineral Composition

Wm. A. Albrecht

Department of Soils, College of Agriculture, University of Missouri

PLANTS, quite unlike animals and humans, are not of one constant chemical make-up. Just how widely the chemical composition of a single plant species can vary, in its essential mineral elements which come from the soil, cannot be reported as simply as can a set of limiting figures. For plants one cannot give lower and upper fatal concentrations of minerals as one can for calcium, phosphorus or acidity of the blood, for example.

If we take hay of a single species or a hay composed of many different kinds of plants, there is a wide variation, for example, in the calcium and phosphorus concentrations which are contributed by the soil. There is likewise a wide fluctation in the protein, which is the essential feed constituent synthesized by the plants, and also the distinct synthetic output by the legumes for the production of which the soils are treated so commonly with limestone and phosphatic fertilizers.

Among 105 samples of northern grown hays given chemical analyses, the following ranges in concentration figures for calcium, phosphorus and protein were reported. The calcium varied from a low of .22 per cent, in a mixed hay of about nine parts of timothy and one part clover, to a high of 2.99 per cent in an alfalfa cut early. This latter, or high figure, is more than thirteen times that of the low one. The concentration of phosphorus was reported as low as .06 per cent in some late cut timothy hay grown on a decidedly lime-deficient soil. It went as high as .22 per cent in a mixture of alfalfa, red clover and timothy. Here the high figure is more than three and one-half times the low one. The protein, commonly determined by measuring the nitrogen, dropped to a low of 5.01 per cent in some late cut timothy and reached a high of 21.75 per cent in an early cut mixture of two-thirds alfalfa and one-third timothy. This gives the larger figure over four times that of the smaller one.

The chemical composition undergoes changes during the growth period of the plant. Consequently the stage of growth as well as the kind of plant makes for these differences in the calcium, phosphorus and protein contents even when grown on the

same soil. That the fertility of the soil makes a difference must also be recognized. If the soil is deficient in one particular nutrient element, it is a common observation that the plant is low in this respect and relatively richer in other nutrients. Then also, some nutrients, more commonly than others, rise to higher concentrations. Potassium is one of these. Among the non-nutrients behaving similarly is silica which, apparently, makes up more of the plant ash as the fertility of the soil becomes less.

Many carefully controlled experiments at the Missouri Experiment Station studying plant composition in relation to the nutrients delivered by the clay of the soil have demonstrated wide variations in the composition of the forages produced. The concentration of phosphorus in soybean plants at less than six weeks of age was almost twice as high, the calcium about three times as high, and the protein one-fourth higher when the variable potassium was properly balanced against the rest of the fertility elements. These two nutrient elements, i. e., the calcium and phosphorus, moving into the crop from the soil, and the third, i. e., the protein, a product of synthesis by the plants, all varied extensively. This occurred, not because any of the elements directly concerned as a constituent of these three was withheld from, or varied within, the soil. It occurred, rather because potassium which serves indirectly in the photosynthetic processes or the starch and bulk-making business of the plant was not in proper balance with the other plant nutrients in the soil.

Plant composition varies widely according to the kinds of plants and their stage of growth. But it varies widely also according to the natural fertility of the soil and the fertility as we control it. We have much to learn about improving the feed output of the plant factory according to our input of the fertility of the soil as needed for fullest service through plants.

Preventing and Curing Stiff-Lamb Disease

Condensed from Farm Research

John P. Willman
Cornell University

THE "stiff-lamb" disease or muscular stiffness is an ailment of sucking lambs that are raised in dry lot. It is most common in lambs born in March and April. Sometimes the symptoms are first noticed while the flock is being driven to pasture. The affected lambs may be able to walk with difficulty or they may be unable to rise without assistance. The trouble usually becomes apparent when the lambs are 3 to 5 weeks old. Many stiff lambs recover if given special care, but as a rule they do not develop into profitable individuals. The extent of the disease varies from year to year. This ailment has been known to sheepmen for many years and has been reported in a number of the states where sheep are raised.

Members of the Animal Husbandry Department of the College of Agriculture working with members of the New York State Veterinary College at Ithaca, have shown that the methods of management of the ewes, such as the amount of exercise during the winter or the level of feeding, have little or no effect upon the occurrence of the disease. The results of experiments conducted over a period of 15 years have thoroly demonstrated that the disease is of nutritional origin. Stiff lambs have been produced when the ewes were fed a ration of alfalfa hay, cull beans, oats, and barley. In the Cornell experiments, conducted from 1930 to 1942, about 26 per cent of the lambs had the disease when their dams were fed this ration. A higher rate of the disease occurred when the ewes were fed alfalfa hay and cull beans. In one test a few stiff lambs were produced when the ewes were fed alfalfa hay and no grain.

Other experiments conducted at Ithaca during the winter and spring of 1934, 1935, and 1937 have shown that the occurrence of the disease was greatly reduced when liberal amounts of wheat bran were added to a ration of alfalfa hay, oats, barley, and cull beans fed to the ewes. Only 4 stiff lambs were produced from 68 that were being raised.

When wheat-germ meal, unex-

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tracted, was added to the rations fed the ewes during 1940, 1941, and 1942, only 1 stiff lamb was produced from a total of 76 lambs that were being raised. This ration consisted of alfalfa hay and a concentrate mixture of 5 parts each of oats and barley, 50 parts wheat-germ meal, and 40 parts cull beans, by weight. The lambs were creep-fed on oats, barley, and wheat-germ meal.

Because wheat-germ meal is rich in vitamin E an experiment with three lots each of 24 ewes and their lambs was conducted in 1943-44 to determine whether the disease could be prevented by feeding vitamin E. This vitamin supplement was fed to both the ewes and to the lambs in one lot and only to the lambs in another lot. All of the ewes were fed cull beans and first- and second-cutting alfalfa hay. No stiff lambs were produced in the lots fed vitamin E, but 13 lambs became "stiff" out of 27 being raised in the lot in which no vitamin E supplements were fed.

Alternate lambs that showed definite symptoms of the disease were given subcutaneous injections of a water-soluble form of vitamin E. Six of the seven lambs so treated made rapid recovery, the symptoms disappearing in 7 to 19 days after the first treatment. The other lamb died even tho it had been given injections of vitamin E. The autopsy showed pneumonia and gross lesions of muscular degeneration or dystrophy in the skeletal muscles.

Five of the six untreated lambs died and the characteristic muscular changes were found upon autopsy. Experiments are being conducted during 1944-45 to test further the value of vitamin E for the cure or prevention of the disease.

Since vitamin E in the forms used in these recent experiments is not readily available to the flock owner, it is suggested for the present that wheat-germ meal, unextracted, be fed to the ewes and lambs to prevent the occurrence of the stiff-lamb disease. From ¼ to ⅓ pound daily should be fed to the ewes and it should be supplied in the creep for the lambs during the dry-lot feeding period if the ewes are fed rations similar to those which have produced the disease in the Cornell experiments. Limited amounts of wheat-germ meal are available at some feed stores at a cost slightly above the cost of other sheep feeds. The feeding of wheat-grown meal to the ewes should be started at lambing time and to the lambs when they are 7 to 10 days old. Liberal quantities of wheat bran or wheat grain should be fed if wheat-germ meal is not available.

Methods of a Master Producer

Condensed from Hog Breeder

Bernard Collins

Clarion, Iowa, a Winner of the 1944 Iowa Master Swine Producers Award

We operate a 465 acre farm in central Wright County, 50 miles north of Ames. When I say we, I'm speaking of my father, one hired man and myself.

This is gently rolling land, all tillable, on which we carry on a four-year rotation—corn, corn, oats, and clover. This rotation gives us Red clover pasture on clean ground every year for our hogs.

Our herd is composed of purebred Chester Whites, but we are not in the purebred business, as we sell all of the hogs on the commercial market.

In the latter part of July or the first of August we pick out the gilts to save for breeding for February pigs and separate them from the rest of the herd. These gilts are looked over individually and picked from the record book for size of litters, size for age, shape, and conformation. These gilts are put in a separate pasture and hand fed a growing ration according to their needs. We try to keep them from getting fat but give them enough feed to keep them growing large bodies. They get plenty of oats, some corn, and protein and have free access to mineral and water.

When we buy the boars, they are also put on pasture with about the same feed as the gilts. We aim to have a boar for every 15 to 20 gilts to be used.

Two weeks before the breeding season starts, we put the gilts on self-feeders of corn and protein to get them to gaining fast. The boars' feed is also stepped up.

We pen breed and ear tag each gilt, then keep a record of her ear-mark, tag, date of breeding and to which boar bred, and mark with paint. Then 24 hours later, we again breed this gilt to the same boar and take her out of the breeding lot.

We take all the trouble to keep records on these gilts so we will know when they are to farrow and so we can trace the litters' ancestry. The gilts bred to each boar are marked with a different color of paint so we can find the right gilt for the right boar faster the second time.

It is generally recognized that a sow or gilt will settle more pigs when bred towards the latter

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part of the heat period, so the double breeding.

After the gilts are bred, they go into the pasture and house where they will spend the winter. Here they are self-fed a ration consisting of 600 lbs. corn, 630 lbs. oats and 660 lbs. of alfalfa hay ground together to which is added 150 lbs. protein supplement. They have warm water and mineral close to the house.

It seems to me that this period in the pigs' life, the gestation period, is one of the most important. The pigs from a sow that is fed a well-balanced ration with plenty of exercise will stand a lot more than a litter of 2 or 2½ pound runts from a sow which has not had a good ration. Those big husky 3 or 4-pound pigs at birth with the same amount of care will be on the market long before a 2-pound pig, if the smaller pig lives to see a slaughtering house.

We have self-fed our brood sows and gilts for the past four years and have had very good results with it. We think it has several advantages. First, we get much more alfalfa into them than we could in any other way, which, in the winter is a decided advantage. Then, too, by getting the feeders 25 or 30 rods from the house, we are sure they are getting plenty of exercise. With self-feeders, there is none of the crowding and pushing around the trough, so the more timid ones get all they want to eat.

I like to tame these gilts and sows somewhat before it's time for them to farrow. It may seem like a waste of time, but a sow that will lie quietly while being worked around will save more pigs than a flighty nervous sow that jumps up whenever someone comes near. It takes but a few minutes a night to walk around scratching and talking to them and they soon become tame.

Our farrowing facilities consist of one 6-pen pig brooder house, eleven 3-pen houses, four single pen houses. The 6-pen house is round with a brooder stove in the center, which heats the whole house. Then we have 30 electric brooders for the 3-pen houses, and both cement and metal troughs. We also have two permanent hog houses for hogs being fed through the winter.

During the winter we clean and wash up the houses and equipment. We use boiling lye water and really go to work on them. We have an old upright steam feed cooker to heat the water, which saves a lot of work. We heat up the boiler, run the steam through a pail of water till it boils and pour in the lye.

After we have the 3-pen houses cleaned, we line them up end to end inside of the grove just a few rods from our house and bank

them with straw. We then run a board fence 10 feet from and parallel to the length of the houses. When the pigs are old enough to get out, we pen off each house separately.

A few days before they are ready to farrow, we wash up 10 or 15 of the first gilts and sows to farrow in the heated brooder house, let them dry, and then run them into a 30 by 30 holding pen just outside the brooder house.

When they are ready to farrow, we run them into the brooder house. They farrow here, stay for a day or two, or until we need the pen for another gilt and then we move sow and pigs to a 3-pen house.

As the pigs are farrowed we wipe them off, get them warm, ear-mark them, and start them to feeding. It always seems that 95% of them farrow between 2 and 5 in the morning, so we throw a bedroll on a couple of planks across the pen and sleep when the stork isn't arriving.

We farrow them all in this brooder house purely for our own comfort. It's considerably warmer and the quarters are less cramped than the 3-pen house.

When the sows and pigs are moved to the 3-pen house, the pigs soon find that the electric brooder is the warmest place, and they come out only to eat.

We have found that the light itself attracts the pigs to the brooder. In the brooder house, if the temperature of the room is warm, we experience difficulty in making the pigs use the hover until we hang a small bulb under it. The bulb doesn't add materially to the heat of the brooder stove, but the light seems to draw them in.

Another little item which we think saves us pigs is the use of ground corn cobs for bedding. A sow will work for 15 or 20 minutes trying to paw up a pile, but they don't pile up. She can't wrap up or cover up the pigs as she can with straw bedding. The corn cobs seem to stay dry longer than straw bedding, too.

Just before the sows farrow they are fed a limited quantity of the same ground feed fed them during the gestation period as a slop. Bran is added when necessary. Twelve hours after they farrow, they are given some water and 24 hours after, receive a thin slop.

This is gradually increased for a week and then I start adding whole corn and oats. At two weeks, I have them on a full feed of corn and oats and protein. The protein carries a large quantity of alfalfa meal so they will not overeat on it.

At two weeks of age, I turn the three sows and pigs of one house together. We take out the gates, make a creep of one pen for the pigs and they have the run of the

house and pen in front. We leave the electric brooder in the creep which draws the pigs away from the sows. The pigs will leave the sows and get under the brooder or as close as they can to it.

At two weeks we put hulled oats in the creep for them to start nibbling on and when they have started eating, we put in soaked corn and protein. We clean the houses whenever they need it, usually 2 or 3 times a week. We castrate at two weeks, vaccinate at 6 or 7 and wean at 8.

We fence the fields of clover into 3½ or 4 acre lots and run 80 to 100 pigs to a lot. Anyway, that is what we try to do. Last spring, we ran into difficulty with the weather. A nice warm day would bring up an inch or two of clover and then in the next three or four cold days the pigs would eat the clover back into the ground. This kept up so long we finally gave up and ran 225 of the pigs into a 15 acre lot which had not been pastured. Fifty of the smaller pigs we left in one of the small lots.

In the problem of watering the hogs in the field, we are very lucky. One field is close enough to the buildings so that we piped water to it. The other three fields have drain wells in them. We drop 100 feet of pipe down the well, put on a pump and pump jack and drive it with a gas engine. We use a force pump so we can pump the water to the different lots. To do away with the necessity of staying to turn off the engine when the tank is full, we determine by experience how much gas it takes to fill the tank at certain levels. Then we just pour in the gas, and leave. The engine will stop when it runs out of gas.

Shade is our biggest problem, as there are no trees. We set posts and build a woven wire framework about four feet off the ground which we cover with straw. This makes a nice cool shade, but it runs into a lot of work for a large bunch of hogs and it soon gets dusty underneath. This problem we haven't solved yet, because it takes too long to move the shelters, and we don't have enough oil to keep the dust down.

On pasture the pigs are fed corn, protein, and minerals, free choice in feeders. The protein is the regular trinity mixture, or as close as I can mix it with the scarcity of some proteins. Part of the time we don't have enough tankage so we have to mix soybean meal, linseed meal and tankage in equal proportions. Now linseed meal is our sticker.

Contrary to a lot of advice we sell direct from the pasture with no feeding floor finish. Last fall we sold the hogs to Hormel at an average weight of 236 lbs., which was just a little too close to the

240 lb. split for comfort. We top them off and sell whenever a truckload is ready.

The gilts bred for June are handled in the same way as those for February except that they farrow on blue-grass pasture. When the pigs are two weeks old, they are moved to the clover fields, where the pigs stay after weaning, until after corn picking time. These pigs are turned in to clean up what is left after we pick the corn with a picker. When the last cornfield is cleaned up, they are moved into winter lots. They stay here until sold.

We have discontinued June pigs this year and I doubt very much if we will ever go back to raising them again, as they seem to farrow during our busiest time of year—corn cultivation and hay-making. And, too, after the war, when the law of supply and demand rules the market, these pigs would be ready to sell when the price was the lowest. So we feel with our set-up and equipment that we can raise more pigs in February and August to a better advantage.

When the February pigs are weaned we pick the better of the sows and gilts to breed for fall. These are handled in the same way except that their ground feed contains nearly 50% alfalfa, as the gilts are now mature and do not need as concentrated a ration. They farrow on blue grass pasture and are moved to a clover field when the pigs are 2 to 3 weeks old. The pigs stay here until cold weather, when they are moved to winter lots.

The protein for both the June and the fall pigs in winter lots is mixed to contain 15 pounds of alfalfa to every 100 pounds of protein.

In summary, sanitation is our one main aim. We cut corners wherever we can *except* in regard to sanitation. It may sound like a lot of work—and it is. But if we can keep our pigs free of diseases, we feel that we are being well paid for our efforts.

New Wealth from Seed

Condensed from Pennsylvania Farmer

Fred V. Grau

Pennsylvania State College

WHEN a dairyman takes the time these busy days to produce new wealth from a crop of grass seed it is news. James J. Markle, Centre County, Penna., is a dairyman and a busy man. With one son, two tractors and good equipment he farms 217 acres of limestone soil.

During the late winter of 1942 Mr. Markle attended a Dairy Day in Bellefonte, a discussion of dairy problems arranged by the county agent. It was the author's pleasure to present a discussion on Grassland Farming. The value of Triple-Purpose pastures caught Jim's attention and he acted at once. The grass and legume seed was ordered and sown with six pecks of oats to the acre on a seven-acre field near the house. The seed mixture was:

Orchard grass (commercial)	5 pounds
Alta fescue (Oregon certified)	5 pounds
Ryegrass (perennial)	5 pounds
Alfalfa (Grimm)	8 pounds
Red clover (home-grown)	3 pounds
Ladino clover	1 pound

This was a heavier seeding than agronomists recommend today.

The oats was combined and the seeding came on fine in spite of a dry summer. The manure he had put on this piece in past years, plus 300 pounds of 0-14-7 fertilizer, when he drilled the oats, gave the seeding a good start. That winter the field got a good coating of manure.

In 1943 he top-dressed with 300 pounds of 0-14-7. A heavy early cut of hay came off this field after which the field was grazed at intervals by the milking herd. The late summer was very dry and growth was slow. During the rest period in August the Ladino clover set seed heavily and went back on the field. Late fall rains sent the sod into winter with a good six-inch cover of vegetation, aided by another coating of manure.

In 1944 the season was wet, but 300 pounds of 0-14-7 went on in early spring. Heavily manured and fertilized bluegrass pastures continued to furnish feed into late June and early July. The broad fields of alfalfa and clover and a second-year field of timothy and adapted red clover furnished all the good hay his herd would need

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for the winter ahead. So here was a seven-acre field of grass up to a man's shoulders, flattened a little by rains, that was an insurance policy which he didn't need either for hay or pasture until July and August. After doing some good thinking, Jim did a little consulting and decided to take a seed crop.

The first of July rolled around, the field turned a golden brown which said, "I'm ripe," and Jim was still puzzled about how to get the seed. If he combined it straight he would do two things: (1) lose half the seed by shattering and (2) increase his labor load by having to nurse the damp seed on the barn floor until it was dry enough to bag. If he cut it with the binder and shocked it he would (1) increase his labor load and run right into a jam on wheat harvest, (2) lose a lot of seed from shattering in handling the bundles. The final decision was to cut it with a grain binder and let the untied straw flow off the deck in a continuous windrow on 10 to 12-inch stubble. Jim's son, Fred, had done this with a timothy seed crop in 1942, and it had worked well. So far as Jim was concerned, no one had ever tried it with orchard grass, but he was game.

About 11.00 A.M. on July 5, Jim and Dick started out with the binder with the tying mechanism disengaged. They had previously mowed two 1-foot rounds for hay to open the field. Things didn't go right. The straw fell crazily in all directions, not in a neat windrow with the heads all one way. They had neglected to tie up the springs which hold the grain for tying. When this was corrected, they laid nice uniform windrows. By noon the seed was shattering so badly they decided to go in and combine directly off the stalk. Two rounds of this and the elevator was plugged with *green* seed which, although it was shattering badly, was too wet to thresh. That was enough for Dick.

Bright and early July 6 they went at it again with the binder and finished the field, laying neat windrows on the high stubble. A heavy dew the night before prevented shattering of seed. Five days later the straw and seed were dry and Dick went at it with his combine equipped with a pick-up attachment. He followed the instruction book, cut off the air, increased cylinder clearance to 5/8 inches and used a wheat screen. In his own words, "The orchard grass seed came out of the spout like oats." A few heavy bunches held moisture and had to be turned with a fork to dry. When they were through there were 100 bags of seed running 40 pounds each, and the seed was dry enough to bag and

store at once to wait for time to clean the crop for sale.

Along in December, Jim found time after corn picking to clean the seed and send samples to the Seed Laboratory at Harrisburg. It was put twice over a 2-screen Clipper Cleaner with a 3/64 x 5/16 screen on top and a 1/25 round screen below. The lower screen removed all the naked seed which resulted from threshing the crop a little too hard. The air blast (very important) was set to remove all the chaff and some of the smaller, lighter good seed. Screens had to be cleaned occasionally because small and broken seed clogged the meshes.

The final result? From a little less than seven acres of Triple-Purpose pasture, Jim Markle has on his barn floor 2,800 pounds of clean heavy seed with the following official analysis:

Pure seed	96.85
Orchard grass	76.00
Alta fescue	21.60
Inert	4.55
Weeds	0.00
Germination	91.75

The weed-free condition of this seed is no accident. For several dew-soaked mornings when it was too wet to make hay, Jim got well soaked walking that field and cutting out every dock, mustard and any other weed he saw.

In addition he has 500 pounds of naked seed on which the official State Seed Laboratory test reads:

Pure orchard grass seed	96.85
Crop seed (Alta fescue and Kentucky bluegrass)	0.37
Inert	2.75
Weeds	0.03
Germination	86.50

This naked seed flows like clover seed and is about the same size. Jim likes it because it will go through the grass seed box on the drill, so he will use some of this seed himself. His answer, when he was asked if he would make seed again this year, was, "At present prices of forty-cent orchard grass and sixty-cent Alta fescue, a fellow would be a fool to miss that bet."

This story would not be complete unless we told that, after taking the seed crop, the field was mowed, and the straw was baled and sold for bedding. The sale of the straw paid all operating costs, the seed was profit, and the dairy herd had good August pasture, with lots of Ladino clover in it. Jim Markle produced new wealth from a grass crop, his land is protected from erosion, improved in fertility and organic matter, he has good summer pasture, and will have an extra War Bond or two in the safe when the seed is sold.

Plant Breeding Key to Progress of Agriculture

Condensed from The Utah Farmer

L. H. Pollard, R. J. Evans, F. M. Coe
Utah Agricultural Experiment Station

THROUGH the efforts of the plant breeder the American farmer is able to grow crops of greater value and better quality than ever before. In some cases breeders have established a new industry while in others they have saved an industry for the farmer. Some years ago the Florida tomato crop was threatened with extinction by a serious soil-borne disease called fusarium wilt. There was no means of controlling the disease until the breeders developed the variety Marglobe which grew in soil infested with the disease.

The production of hybrid corn is perhaps the most outstanding example of how the plant breeder has been able to increase production through the improvement of crop plants. Use of corn hybrids has made it possible to increase yield, quality, uniformity, and suitability for special purposes. Increased yields of from 15 to 35 percent over the standard varieties have been obtained. Approximately 50,000,000 acres of hybrid corn were grown in 1943, representing over 50 percent of the total acreage in the United States.

The producer and consumer of small cereals have been no less benefited. In the hard red spring wheat producing area Marquis was the leading variety. However, it was susceptible to the rust disease. Plant breeders developed the rust resistant variety, Thatcher, which could be grown under those conditions. No less important has been the development of smut resistant varieties of wheat for Utah farmers. Crops in many cases were almost complete failures until Relief, Cache and Wasatch wheats were developed.

The fruit producer has also been greatly benefited by new varieties developed by the plant breeder. Most of our improved varieties of small fruits as well as many tree fruits have been a direct result of breeding. Breeding of fruits has not been as important as the breeding of other crops because of the many difficulties involved such as the time

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necessary to grow each generation and land required for such large plants as fruit trees. Where varieties in most crops can be obtained in 6 to 10 years it may easily require twice that time to establish a fruit variety.

It would be difficult to estimate the value of all of the plant breeding work that has been done. However, it is indeed true that the money returns from higher yields and lower costs has amounted to many millions of dollars annually. The cost of this breeding program has been only a small fraction of its actual value.

The practice of plant selection is as old as man, for man has probably from the beginning saved the better plants for seed. The occurrence of natural hybrids and mutations in nature resulted in a certain amount of variation and through natural selection some improvement resulted. While hybridization of plants was reported as early as the end of the seventeeth century, it was not until 1866 that the Austrian monk, George Mendel, reported on controlled hydridization studies in peas in which he was able to establish mathematical rules for determining the behavior of heredity in plants. This work lay forgotten for 34 years until it was rediscovered by three independent workers: DeVries of Holland, Correns of Germany, and Tschrmack of Austria. This marked the beginning of the modern science of genetics, the basis of modern plant breeding.

Since the beginning of the century this young science has made great progress. It has been a fascinating study because it unravels some of the mysteries of life.

In making hybrids, Mendel first showed that as a result of crossing certain parental characters were expressed over others in the first, or F1 generation, and these were considered to be dominant. He also found that in the second or F2 generation the characters would segregate in a ratio of 3 of the dominant character to 1 of the recessive character. For instance, he crossed tall plants with short; the F1 plants were all tall, but inasmuch as the short parent gave part of the germinal material these tall plants could not be of the same constitution as the tall parent. This was proved in the next generation where a ratio of 3 tall to I dwarf was obtained. He further found that when these plants were self-fertilized the dwarf and one-third of the tall plants continued to breed true. The other two-thirds of the tall plants segregated as did the F1 plants.

When he combined the characters tall and dwarf with the characters of smooth and wrinkled seed he found they would

segregate independently of each other. That is, each would give a 3:1 ratio of dominant to recessive in the F2. Then when combined they would give a ratio (tall and smooth being dominant) of 9 tall smooth, 3 tall wrinkled, 3 dwarf smooth, 1 dwarf wrinkled. One of the tall smooth, 1 of the tall wrinkled, 1 of the dwarf smooth and the dwarf wrinkled would be homozygous and would breed true. Theoretically, then, if a plant breeder were anxious to combine the two characters dwarf and wrinkled seed he would need to grow 16 of the F2 plants in order to recover the double recessive type he was seeking. Of course, he would need to grow several times this amount if he were to be sure of getting the desired type. The more factors involved the more difficult the problem becomes. For instance, for three factors it would require 64 plants, for four factors, 256 plants; for five factors, 1,024 plants, six would require 4,096 plants, seven, 16,384; and eight would take 65,536. Many times the plant breeder needs to combine a large number of characters, such as yield, quality, vitamin content, and disease resistance, all determined usually by a large number of factors, so large populations are necessary. Getting such materials into the second generation is really only a beginning. It is necessary to continue selecting, inbreeding, outcrossing or backcrossing in order to obtain the desired types.

"Linkage" Complicates Work

The plant breeder is fortunate indeed if he is dealing with characters that are inherited independently. Frequently he has a further complication of having characters which tend to be inherited together. Such a condition is termed linkage. If the character he desired is closely linked to an undesirable character he is unable to progress further without some special treatment to break the linkage. Usually a certain percentage of progeny will segregate out allowing for the obtaining of desired types, but of course this may require a greatly increased segregating population.

The plant breeder of today needs to have some training in the science of cytology, or the study of the structure, function, and life history of the cell. Many times problems arise which cannot be fully explained by the principles of genetics but must have additional explanation by the actual condition of the chromosomes within the cell on which are located the genes or the determiners of heredity. This science has made rapid progress also and the well trained plant breeder is one who can use both cytology and genetics to his advantage.

The best trained scientific worker may still be unqualified to carry on an improvement program in any crop if he lacks a complete knowledge of the crop with which he is to deal. He must of necessity know the desirable characteristics of all the varieties of that crop so as to be able to use those varieties for breeding which will contribute the best germ plasm.

While somewhat the same methods of breeding can be used on all plants, various techniques may need to be devised for different crops. In some cases all of the pollinating needs to be done by hand while in other cases insects may be used as pollinators. Likewise the emasculation of the flowers or the removal of the anthers to prevent self-fertilization, may need to be done with a pair of forceps in some plants, or different measures may be used in others, while in some it may not need to be done at all. Each crop requires some study to determine the best method for obtaining crosses.

The plant breeder may have a knowledge of the foregoing problems but in addition he should possess a great deal of patience if he is to be really successful. He must usually take complete notes on thousands of individuals and keep much of the information in mind. In addition he needs to discern small differences between plants in order to make careful selections in his segregating material.

The plant breeder today is not content with just developing new varieties. Before any breeding program is instituted he realizes that there must be a need for such a program. For instance, if a crop is susceptible to a certain disease, or if it is necessary to increase the earliness of a crop, or to improve its quality, the plant breeder will begin work on the problem in the hope that he can solve the difficulty. A good example is found at the Utah Station where the problem of developing smut resistant wheat varieties is being studied. Two new varieties, Cache and Wasatch, have been released and are resistant to smuts but the study will continue in the hope that even better varieties can be developed. While a variety may be resistant to a particular disease it is still desirable to continue the studies because new strains of the disease organism may result in the resistant varieties again becoming susceptible. Many examples could be cited of such occurrences.

Today, greater emphasis is being placed on quality of the product. A new wheat variety, if it is to become important, must have a high milling quality. A new tomato variety must be disease resistant and must have good edible

and canning qualities, combined with high vitamin content.

The breeder is taking advantage of the increased vigor of hybrids in other crops as well as in field corn. Practically all of the better sweet corn varieties are now hybrids. These have greatly improved the canning quality and uniformity of the ear and plant. Onion producers may likewise be benefited from the use of hybrids.

In commencing improvement studies on any crop it is important to test all material available from any source. It may be possible to find the desired type already in existence. For instance, such varieties as Red Fife and Turkey wheat introduced into this country from Russia have been of considerable value to the cereal producers and as parent materials for other varieties. Incidentally the Federal Bureau of Plant Introduction maintains a large staff to further the work of introducing new varieties.

In many cases local or introduced varieties are heterogeneous so that frequently improvement can be brought about by selecting individual plants possessing the desired characteristics. Where improvement can be obtained in this way, it is much quicker and easier than where hybridization is required between different varieties or species. A good example of this was the obtaining of brown blight resistant lettuce in the Imperial Valley of California by selecting resistant plants in fields of the New York variety. Another example is Kanred wheat which was developed from hundreds of selections in a wheat variety called Crimean. Today, however, there is less chance of obtaining improved varieties of any crop by this method than there is in the use of hybridization to combine the desirable characters from different plants, varieties, or species.

If the desired characteristics are not to be found in any variety or by selection within a variety it then becomes necessary for the breeder to combine the desirable characters from several sources. He may use different varieties or in some cases different species in order to develop his synthetic variety. Then it is necessary for it to be thoroughly tested under field conditions in areas where it is to be grown. This testing may require several years in order to prove that the new variety is better than the other varieties being grown.

At the present time breeding studies are being conducted at the Utah Agricultural Experiment Station on wheat, barley, alfalfa, forage crops, tomatoes, lima beans, onions, celery, cherries, apricots, strawberries and raspberries.

How Much Should a Pullet Cost?

Condensed from Poultry Tribune

L. E. Weaver
Cornell University

A PULLET is an investment. Some investments pay dividends. Some do not. The original cost of an investment may determine its capacity to pay dividends. A pullet that has cost too much cannot return large dividends, no matter how well she may lay.

Costs vary from year to year, of course, as the following examples will show.

In 1918 Purdue published a bulletin giving the cost of growing White Plymouth Rock pullets at the Indiana Experiment Station in 1916 and 1917. Those were war years. Feed prices and other costs advanced from 1916 to 1917, and the net cost of raising a pullet, allowing credit for all income from cockerels, was 43 cents in 1916 and 70 cents in 1917.

The average net cost of rearing White Leghorn pullets to six months of age, as figured from records from eight Delaware farms in 1928, was $1.18.

At the Massachusetts Station, an estimate was made of the "probable cost of raising pullets (American breeds) in 1935." Current prices were applied to known average requirements for producing pullets in Massachusetts.

Required for One Pullet		Price	Cost
2.5 chicks	@	$0.14	$ .35
22 lbs. mash	@	2.56	.563
18 lbs. scratch	@	2.27	.409
1 hr. labor	@	0.25	.25
Other cash costs			.18
Overhead cost			.20
Gross cost per pullet			$1.952
Credit: 2½ lb. broiler	@	.18	.45
Net cost per pullet			$1.50

The item, "other cash costs," include fuel, litter, grit, dried milk, etc. Overhead cost allows 20 cents to cover depreciation of buildings and equipment, and interest on the investment.

In 1936, the average net cost of pullets raised on 42 farms that kept cost-account records in New York State was $1.08. In this summary the average cost of chicks was 11 cents, "grain and cash" $2.24 per cwt., labor 32 cents per hour. Thirty-four

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pound of feed were used in raising a pullet. This study included both Leghorns and heavy breeds.

Three items, feed, labor, and the cost of chicks, made up more than four-fifths of the total cost of growing a pullet. These costs vary from year to year, and largely account for the wide variation from year to year in the average cost of growing pullets. Because the price of feed, chicks, and labor is almost entirely beyond the control of the poultryman, it might seem as though there would be a fair degree of uniformity in the cost of growing pullets on different farms in any given year. That is far from what happens, however. For example, take the 41 cost accounts on pullets reared in New York State in 1941. One farm had a net rearing cost of only 48 cents per pullet, another of 50 cents. At the other extreme was a farm with a cost of $1.70. On 12 farms, the cost was less than a dollar; on 13 farms, more than $1.25.

The most recent cost-of-production *survey* (not cost-accounts) in New York was made in 1940 and is reported in Cornell Bulletin 797, "Cost of Incubation and Rearing On Commercial Poultry Farms, 1940-41." From that bulletin I quote:

"While the average net cost of raising a pullet to maturity was $1.10, it varied on different farms. Twenty percent of the farms raised pullets at a cost of 80 cents or less per pullet; 15 percent of the farms had a net cost of $1.40 or more per pullet. On 28 percent of the farms, the net cost of raising a pullet was within 10 cents of the average of all farms."

Obviously it *is* within the power of the operator to influence all the costs of rearing in his favor.

Less feed is needed to grow a Leghorn than one of the American breeds. Therefore, the pullet costs less. In the New York survey, the difference was 12 cents. Feed did not make all the difference. Heavy breed pullets require less feed than Leghorns to grow a pound of weight. As meat birds they are worth more than Leghorns. If the aim of a rearing enterprise is pullets for egg production, feed per pullet is more important than feed per pound of gain.

Feed cost figures include the feed lost to rats, and wasted by wind, overfilled and poorly-designed feeders. Astonishing savings are possible here.

Quality of feed comes ahead of price. Feed may be "cheap" or it may be "inexpensive." Inexpensive feed may cost more per hundred pounds, but because of its high growth-promoting quality it gives greater returns per dollar invested.

Every pullet lost increases the

feed cost, and all other costs, of the pullets that remain. Rearing mortality is no longer a serious problem on most farms, but "unaccounted for" losses grow larger each season. Foxes, dogs, and other predators constitute a menace that is not recognized sufficiently.

Poultry pastures plus restricted mash feeding have shown a 13 percent saving in purchased feeds in experimental tests. Poultrymen estimate savings up to 30 percent.

Haggling over the price of chicks is definitely *not* the way to reduce the cost of one's pullets. A survey in the Delmarva broiler section showed that those who paid most for chicks made the most money. The reason is obvious. They got better chicks. The chicks lived better, grew faster. It can be the same with pullets. The wise buyer watches for quality first, but of course, does not pay unreasonable prices.

Caring for more chicks with less help is one secret of growing pullets at lower cost. Three hundred chicks started in a room 10x12 feet is a safe rule. That puts 2½ chicks on each square foot of floor space. Five hundred chicks under one large brooder in a room 14 feet square also puts only 2½ chicks on each square foot. Larger brooding pens are labor-savers. So are larger feeders and waterers, and more of them. Fewer trips are needed to keep them supplied. The trend in our state now is away from colony brooder houses, toward a larger house with one central heating unit, with range shelters and shades on Ladino pasture after about 8 weeks.

Our poultrymen are adding willingly and wisely to their rearing chores by starting the chicks much farther away from the laying houses than in the past. Reduction of losses from paralysis and other forms of the leukosis complex resulting from this isolation program, in the long run, lowers the cost per pullet.

In years when broiler growing is profitable, pullets are grown from straight run chicks for less than from sexed pullet chicks, because the profit on cockerels is credited to the pullet account. With sexed chicks in the 1940 survey, heavy breed pullets cost $1.32, but only 96 cents from straight run chicks. With light breeds, the costs were $1.15 and $1.02.

Electric brooding saves worry as well as labor, and the cooler rooms made possible by electric brooding exert a beneficial influence on the health and stamina of pullets.

"Black Sheep"

Condensed from Farm Journal and Farmer's Wife

It probably doesn't pay to *be* a black sheep but it may pay to *raise* them. At least that's the way Harold Hemingway feels about it. Here's his story:

Six years ago he had $500, a little 12-acre "ranch" in San Bernardino County, California, and an idea.

His idea was to raise Karakul sheep. He talked with breeders, read everything he could find and studied the market.

It all looked so good that he invested in five of the best ewes his $500 would buy, and took them to his little ranch. Hemingway's idea paid handsomely. Today he has the largest flock of Karakuls in the country, nearly 2500, including some "boarders" he keeps for fellow breeders, and his 12 acres have expanded to 2500.

"What I have done, anyone can do," says Hemingway. "I think the industry is one for the returning soldier to think about. There is a great demand for the fur, and Karakuls are no harder to raise than ordinary sheep. The main thing is to get good stock, the kind that produces the top-quality fur."

Hemingway also has a Karakul dairy, both novel and profitable. Twice a day the ewes, whose lambs have been killed for their pelts, are milked. The butterfat-rich milk is shipped to Los Angeles, and made into a feta-type cheese, a delicacy of the Old World. Income from the dairy averages about $6 a month per ewe.

Three kinds of fur come from Karakul lambskins. These are known in the fur trade as broadtail, the most expensive, which comes from premature lambs; Persian lamb, the black, tightly-curled fur from lambs three to ten days old; and caracul, the lustrous, open-type fur with the wavy pattern from lambs not older than two weeks.

Before the war the United States imported each year about four million Persian lambskins, mostly from Asia. The present production in this country is only about eight thousand skins a year.

The U. S. Department of Agriculture has found the Karakul extremely hardy, and especially adapted to the Southwest and other dry climates resembling that of Bokhara, its original home in Asia.

No Karakulas have been imported from their homeland since 1914 because of the danger of bringing in animal diseases. Accordingly, the number of purebreds is small. However, breeders have been mating purebred Karakul rams with native American ewes. By continually grading up stocks, they produce a fur of market quality.

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Water Cress — A Big Business

Condensed from Market Growers Journal

WATER CRESS is not a grass, nor yet a weed, as is the common misconception. When you hear water cress mentioned you invariably hark back to some time or other in your youth when you gathered it along runs and brooks.

Today water cress, like other little acorns, has grown to be a big business, a commodity of commercial value and healthy content. C. E. Dennis, of Martinsburg, in Berkeley County, West Virginia, has made that possible, having streamlined and improved the business started by his father, the late Frank Dennis, in 1874.

The scientific cultivation of water cress started, like most American enterprises of that era, on the proverbial shoe string, and as the demand increased, so did the business expand. Water cress had been raised commercially in other countries for over a hundred or more years, notably in England and Germany, but it remained for the inherent courage and vision of Americans to raise it to the commercial level it now occupies today.

It is necessary to go back a bit and see how this unique and interesting business started, to fully understand the heights it has attained today. About ten years after the Civil War, a young New Jersey boy, Frank Dennis, started to gather the water cress that grew wild in the spring branches near his home at West Long Branch. He gathered it up by the basketful and sold it to his more prosperous neighbors. Among these neighbors was John Hoy, then president of the old Adams Express Company. Mr. Hoy noted the enterprise of the young man and took a genuine liking to him.

The upshot of this friendship was that Mr. Hoy sent packages of young Dennis' delicacy to his friends among the big hotel operators in New York. These men, always on the alert for something novel for their guests, realized they had hit upon a garnish that had the added feature of being both palatable and decorative, so the introductory gifts brought repeat orders. The New Jersey beds were expanded and for a time provided a sufficient supply for the mild months of the year. However, increasing orders made imperative a larger source of supply. Young Dennis saw the need of a year round supply, from which he could fill orders when

Reprinted by permission from Market Growers Journal, Louisville, Ky., May 1, 1945

harsh New Jersey winters set in. With a steady supply of water cress there would be no let up in business and no loss of customers.

So Frank Dennis followed the sun under which he hoped to grow cress the year round and to make the fortune. Around 1885 he started shipments from Chambersburg and Shippensburg, Pa., and about 1890 went to the limestone section of West Virginia, in the eastern panhandle of that state, and there he bought another big farm and turned it into cress ponds. These West Virginia ponds are still in use today, mainly so through far-sighted and judicious use of the soil.

The West Virginia winters being severe enough, Frank Dennis looked farther afield the next time in his endless search for a satisfactory year round supply of cress. In 1906 he started operations in Wellington, Alabama, and in 1908 from Adairsville, Georgia. Still expanding, in 1915 he finally located in Huntsville, Alabama, which is today the largest Southern distribution point for Dennis cress in the United States.

Today, C. E. Dennis, his son and successor, has under cultivation in Alabama forty-five acres, in Virginia five, in West Virginia thirty, in Maryland ten, and in Pennsylvania fifty acres. He has men working for him that worked for his father, and their loyalty, speed and dexterity make it possible for him to move a whole business overnight, lock, stock and barrel to his Southern plant in Alabama, when the first frosts and wintry blasts force suspension of shipments from West Virginia. It is a tribute to the modern stream-lining business methods of the twentieth century that a whole business is able to pick up everything from office equipment to the household effects of some of the workers and, like the Arabs, "silently steal away" some 900 miles distant to another state and a more suitable climate, in order to keep shipments moving without interruption 365 days of the year.

As the years progressed, so did the methods of cultivation and shipping. This particular business has grown from horses and plows and delivery from a market basket on the arm, to tractors, trucks and fast express. It has grown from spasmodic selling methods to salesmen in key cities and shipments into thirty-eight of our states. Specialized cultivating methods applied by the Dennises have resulted in cress reaching the market, not only clean and of extraordinary quality, but it meets the high standards of cleanliness set by the Government on the food industry today. The day of eating contaminated cress from creeks and runs is past.

Water cress is a useful green, both for its appearance in lending itself to garnishment and as a salad base, and for its high content of important minerals. The consumption of greens in salads has greatly increased in recent years, due largely to the discovery that they are rich in vitamins. It is known that cress contains calcium and iron, more iron in fact than is found in that widely reputed source of this mineral, namely spinach. Water cress is also good for its heavy vitamin content.

Water cress has been called the grass with a spice. The reason for this is the pungent, somewhat salty and quite bitter flavor. It has an individual flavor somewhat reminiscent of horseradish and also of nasturtium pods. The bitterness of this crackling, crispy little plant is due to its potassium content. In this country we regard cress as an ingredient of salad, or as a garnish, a mere understudy to parsley. In France and England water cress season is celebrated by its liberal use in everything from the British "cress sandwich," to the French "bifteck vert pre," which is a steak literally smothered in nosegays of cress.

Several things are necessary for the correct cultivation of water cress, namely, climate, water supply and soil. The proper culture of the plant develops in it the bitter and tonic principles, and the phosphates will be found in proportion to the manure employed on the ground in which it grows. Finally, the quantity of iron will depend upon the richness of the water in which the cress is planted. Ponds may cover an area of several acres, the largest in West Virginia being close to forty acres. They are renewed, that is to say, drained, plowed and replanted every year, depending upon the variety of cress shown, of which there are four separate and distinct varieties, necessary for a year-round supply. The Dennis method is to plow and excavate the ponds to a depth of two or more feet, the surplus ground being banked and graded into firm walks running the length of the pond and spaced according to the width of the pond desired. At times lime fertilizer and cow peas are used in the soil to store nitrogen, that is, in the off years when the ponds are being rested. The life of a pond depends upon the care you give it. For example, the ponds in West Virginia have been growing cress for more than forty years and are as good today as when they were started.

After a pond is plowed and harrowed several times to kill off all foreign vegetation, a small amount of water is turned back and the pond is ready for planting. This consists of using plants

and transplanting, or mowing off the tops and planting the clippings. After being seeded, the clear, sparkling spring water, coming from a limestone source, is allowed to gradually run into the pond, its depth being controlled by a system of concrete dams and wooden locks. About a week after planting the cress has taken root. More water is applied each week until about the fourth or fifth week after planting the cress is cut, the first cutting being thin, but after each cutting the cress becomes thicker until it is a mass of vivid green from bank to bank.

When ready to harvest, speedy pick-ups carry the crew of men to the ponds, where the cutting of thousands of bunches is brought back to be precooled, packed and shipped on the same day of cutting. Thirty thousand bunches have been packed and shipped in a single day. The cutters wear high "hi-length" boots, carry stout even lengths of soft pliable twine at their belts for tying the bunches, and with their sharp knives move up the pond much in the manner of harvesting, cutting in rhythmical strokes, a length of twine, a few deft twists of the wrist and a flip over the shoulder to the men carrying tubs, which, when filled are carried to the trucks. They in turn hasten back to the packing houses where the freshly cut bunched cress is pre-cooled for the necessary length of time and then packed. This consists of a bottom layer of heavy Kraft paper, a layer of chopped fine ice, next a layer of waxed Frigid-wrap paper, then the water cress in two layers with the stalk end laid so as to get the full benefit of the ice, next waxed paper and so on. Dennis cress is always shipped on the same day of cutting and next day delivery is assured, depending upon distance required to travel.

The four seasonal varieties of cress were named, in the casual way most things are named, after the name of the owner of the springs where that particular variety was found or from the section in which it was found. For instance, the summer variety was called Kline cress after a Mr. Kline on whose land it was first found; Aldridge cress, a large leaf cress used widely in winter was named for the farmer who owned the brook; Swan Pond cress was named so because swans used the pond in which it was found and Virginia cress, another summer variety, was named for the state in which it was found.

The United States is the most highly favored country in the world for raising aquatic plants. Abundance of pure running water, proper soils and atmospheric conditions have been largely respon-

sible for the commercial undertakings of this character. The cress which reaches the market today is far superior to the wild kind. The plant is so distinct in its character that no botanical learning is necessary to distinguish it from other greens. Its leafage consists of from five to seven ovate or roundish leaflets which increase in size upward. For a vegetable product, which is in the main consumed without cooking, water cress, because of its water source, is becoming more and more surrounded with the same vigilance used in safeguarding public water supplies.

While cherishing the heritage handed down to him, Mr. Dennis has endeavored to keep pace with ever changing modern methods by constant experimentation in cultivation and distribution. He has recently started experimentation in the frozen food line, having secured his own deep freezing unit.

There is no large culinary or hotel show of any size at which you will not find the Dennis water cress booth, with Mr. Dennis on hand to assist and explain and hand out the numerous pamphlets and literature on water cress and to acquaint the public with the crisp delights of his succulent, healthful tangy green.

About Feeding Chicks

It is frequently recommended that chickens be started on hard grain. This system of feeding largely prevents pasting.

The recommendation calls for the feeding of hard grain alone for three full days. This definitely gives slower growth. Here is a modified system that seems to be working out quite satisfactorily:

First day—Feed chick size grain and grit on clean paper. Give water or milk for drink.

Second day—Feed grain and grit on clean paper to 3 p. m. when starter mash is fed for remainder of the day.

Third day—Same as second day.

Fourth day—Take up papers. Feed mash from hoppers. Feed no grain.

Sixth week—Change to growing mash. Feed oats from hopper. Feed corn and wheat from hoppers or ground.

This information is from Massachusetts State College.

—N. J. Farm and Garden

Decayed Fence Posts Unnecessary

Condensed from New England Homestead

R. B. Parmenter

BUILDING a fence or repairing a fence with untreated posts is a waste of time. Fence posts cut from some of the trees in the farm woodlot will last a long time in the ground without any type of preservative, while fence posts cut from many other kinds of trees will not last more than two years unless treated with some type of preservative. Probably the best tree to use for fence posts is the black locust. If a two- or three-inch post is used, there will be too much sapwood and not enough heartwood to prevent decay, but if a five- or six-inch post is used, the heartwood is sufficient to prevent decay. It isn't every farm woodlot which will produce black locusts, consequently it is necessary to use soft maple, poplar, white and yellow birch, ash, or other hardwoods which would decay within two or three years after setting them in the ground. These can be treated with either zinc chloride or Osmoplastic, and the life is lengthened 10 or 12 years. Zinc chloride can be obtained from a chemical manufacturing plant.

Procedure to Follow

In order to preserve a post with zinc chloride the following steps are taken:

1. The bark is peeled from the large end of the post for about four to six inches, leaving a smooth, clean surface so that a tight joint can be made between the wood and the rubber.

2. A section of an old inner tube about 2 to 2½ feet long is slipped over the peeled surface and bound in place with a cord, wire, rubber band, or other suitable material. Place the post on a rack with the large end about a foot and a half higher than the small end. Fasten the loose ends of the tube section to a frame so that the preservative cannot spill out, but will be kept in close contact with the end of the post.

There is also another method of introducing the zinc chloride to the end of the post. Sections of iron pipe varying from two inches to five inches in diameter may be secured. These should be 8 or 10 inches in length. One end can be sharpened so you can

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drive it into the posts, then the zinc chloride can be poured into this tube.

3. Pour in a measured amount of the 10% solution of zinc chloride. A five-inch post would need a gallon of the material, and a gallon and ½ for 6-inch posts, and a 7-inch post about 2 gallons of the material. Within 2 hours you will notice sap running out of the bottom of the posts and know that the preservative has flowed into the wood. The post is now thoroughly impregnated with the preservative and can be set in the ground.

Osmoplastic comes complete with a waterproof bandage in a handy package for convenient use. It provides deep penetration at the ground line to insure effective protection against decay. This material contains three poisonous salts which effectively kill all wood destroying fungi and seal off any possibility of decay entering the wood. It also has some creosote which protects the outside, while the salts are preserving the inside of the posts.

Osmoplastic Treatment

The necessary steps in preserving fence posts with Osmoplastic are as follows:

1. Cut the post to the length desired.

2. With a draw shave or axe, remove nine inches of both the inner and outer bark completely around the post, starting at a point 2 inches above the ground line and finishing 7 inches below the ground line. The ground line is determined by the depth you are to set or drive the posts.

3. Brush on the Osmoplastic preservative with an ordinary paint brush, completely covering the area from which the bark has been removed and also brush the top of the posts.

4. Wrap the bandage which comes with the package or some waterproof type of paper completely around the treated area, making sure that it overlaps. Tack the bandage securely along the overlap.

5. Now the post is ready to be set in the usual way in the ground.

This work can be done during the winter, on stormy days, or whenever it is impossible to work outdoors. If this work is done ahead of time, the posts will be ready to use when you replace your rotted fence posts in the spring.

FOR THE FARMER'S LIBRARY

These books are recommended as outstanding in their field:

A Living from Bees — By Frank C. Pellett, Field Editor of American Bee Journal. Orange Judd Publishing Co., Inc. (1943). $2.00.

America's Garden Book — By Louise Bush-Brown and James Bush-Brown. Charles Scribner's Sons $3.50.

Animal Sanitation and Disease Control—By Dr. R. R. Dykstra, Dean of the School of Veterinary Medicine, Kansas State College. The Interstate Printers and Publishers. $2.85.

Beef Cattle — By Roscoe R. Snapp, Asso. Prof. Animal Husbandry, Univ. of Illinois. John Wiley & Sons, Inc. $4.00.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A. & M. College of Texas, College Station, Texas. The Interstate Printers & Publishers (1941). $2.00.

Breeds of Livestock in America—By Henry W. Vaughan, formerly Prof. of Animal Husbandry, Iowa State Coll., Univ. of Minn., Mont. State Univ. College Book Company. $3.75.

Dairy Cattle Feeding and Management — Third Edition — By H. O. Henderson, Professor of Dairy Husbandry, West Virginia University. 1st Edition by Carl W. Larson and Fred S. Putney. John Wiley & Sons, Inc. $4.00.

Dairy Science — By W. E. Petersen, Ph.D., Assoc. Prof. and Assoc. Dairy Husbandryman, Univ. of Minn. Edited by R. W. Gregory. J. B. Lippincott Company (1939). $4.00.

Diseases and Parasites of Poultry — By Edgar Hugh Barger, D.V.M., Berkeley, Calif., and L. E. Card, Ph.D., Prof. of Poultry Husbandry, Univ. of Illinois. Lea & Febiger. 3rd Edition (1943). $3.75.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $5.00.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.00.

Forestry in Farm Management—By R. H. Westveld and Ralph H. Peck. John Wiley & Sons, Inc. (1941). $3.00.

Grow Your Own Fruit—By M. G. Kains, formerly with U. S. Dept. of Agriculture; Professor of Horticulture, Pennsylvania State College. Charles Scribner's Sons. $3.50.

Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $2.75.

Livestock Production—By Walter H. Peters, Chief of the Division of Animal and Poultry Husbandry, Univ. of Minn. McGraw-Hill Book Co., Inc. $3.50.

Livestock Judging Handbook — By Julius E. Nordby and W. Malcolm Beeson, Ph.D., Asst. Professors Animal Husb., Univ. Idaho. The Interstate Printers. $2.60.

Modern Agricultural Mathematics — By Maurice Nadler, B.S., A.M. Dept. of Mathematics, Newtown High School, Long Island. Orange Judd Publishing Co., Inc. (1942). $2.00.

Modern Farmers' Cyclopedia of Agriculture—By Earley Vernon Wilcox, Ph.D., Agricultural Writer, formerly with U. S. Dept. of Agriculture. Orange Judd Publishing Co., Inc. (1944). $4.50.

Natural Principles of Land Use—By Edward H. Graham,, Chief of the Biology Division of the Soil Conservation Service. Oxford University Press. 275 pages. $3.50.

Poultry—By A. R. Winter, Asst. Prof. Poultry Husbandry, Ohio State Univ., and E. M. Funk, Asst. Prof. Poultry Husbandry, Mo. State Univ. J. B. Lippincott Co. $5.00.

Practical Farming for the South — By Benjamin F. Bullock, now Prof. of Rural Education, Atlanta University, Atlanta, Georgia. Univ. of North Carolina Press. $2.50.

Profitable Poultry Keeping — By H. Clyde Knandel, Prof. and Head, Dept. of Poultry Husb., Penn State College. Orange Judd Publishing Co., Inc. $3.00.

Pork Production—By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. The Macmillan Co. $3.75.

Repairing Farm Machinery—By Ivan G. Morrison, Asst. Professor Agri. Education, Purdue University. The Interstate Printers & Publishers. $1.80.

Sheep Production—By Levi Jackson Horlacher, B.S.A., M.A., Asst. to Dean, Col. Ag. Univ. Ky. McGraw-Hill Book Co., Inc. $4.00.

Soil Conservation — By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Department of Agriculture. McGraw-Hill Book Company, Inc. $6.00.

Some Common Diseases of Cattle—By George R. Conn, B.S.A.H., D.V.M. Orange Judd Publishing Co., Inc. (1942). $1.50.

The American Land—Its History and Its Uses — By William R. Van Dersal, biologist in the United States Department of Agriculture. Oxford University Press. $3.75.

The Farm Primer—By Walter Magnes Teller, formerly with the Farm Security Administration, U. S. D. A. David McKay Co. $2.50.

For the convenience of our readers, books listed may be purchased through this Department. Address Farmers Digest, Ambler, Pa.

BOOK NOTES

WEEDS OF LAWN AND GARDEN — By John M. Fogg, Jr., Vice-Provost and Professor of Botany, University of Pennsylvania. Illustrated by Leonie Hagerty, graduate of Pennsylvania School of Horticulture for Women.

This is a very unusual book on a very common subject. It enables one who knows little of botanical terms and the use of keys to sit down with weed in hand and find the name of his plant and how to control it. This is made possible in two ways. One is by the excellent illustrations, which not only show the characteristics of the weed in flower or fruit, but also its characteristics, if they are distinct, in the seedling stage. The other is by means of the comments which accompany each illustration. These call attention to the obvious characters of each weed which set it off from others, to the habitat in which it is usually found, and how to control it. Other pertinent information is also often included.

Other unusual features of the book are the very interesting accounts concerning the dispersal, the geographic origin, the extermination, the chemical control of weeds and their use as soil indicators. At the end of the book are included a glossary and bibliography. Ruth Patrick, Ph. D.

Publishers: University of Pennsylvania Press 215 pages $2.50

INDEX

f Cattle

Cattle in the Pines ..... Nov., 1944
More Beef from Fewer Cattle ..... Nov., 1944
Beef Cattle Do Better on Silage .... Dec., 1944
Size Is Important ..... Dec., 1944
Coarse Roughage for Cattle ..... Jan., 1945
Grass Fed Steers Make Most Money Jan., 1945
Cattle Like "Suiter's Grass" ..... Feb., 1945
Finish Young Steers with Grass and Grain, Feb., 1945
The Story of Meat ..... Feb., 1945
Need of Efficiency ..... Mar., 1945
Dark Beef ..... April, 1945
What is Type? ..... April, 1945
Breeding of Charollais Cattle ..... April, 1945
Bang's Disease Control ..... April, 1945
Grow Your Own Feed ..... May, 1945
Rodeo—A Little of Its History .... June, 1945
Gestation Periods of Five Breeds of Livestock ..... June, 1945
Phenothiazine Boosts Steer Gains .. June, 1945

nservation

Rebuilding Eroded Soil is a Slow Process, Aug.-Sept., 1944
Water Spreading on Range Land .. Oct., 1944
It's Producing War Food and Feed .. Oct., 1944
Man with a Bull-Tongue Scooter .. Nov., 1944
Taking Our Soils for Granted .... Nov., 1944
Soils Take a Rest ..... Dec., 1944
Undercover Farming ..... Dec., 1944
From Poverty Grass to Alfalfa .... Jan., 1945
Didn't Plow Sod Land ..... Jan., 1945
Sods for Soil Improvement ..... Feb., 1945
Terracing for Fun ..... Feb., 1945
Reed Canary Grass in Gully Control Feb., 1945
Equipment Adapted to Contour Farming, Feb., 1945
Your Land Belongs to Tomorrow .. Mar., 1945
Take Care of the Range and the Profits Take Care of Themselves ..... April, 1945

ops

Our "Chinese" Food (Rice) ..... Nov., 1944
Hubam Clover a Four-Way Crop .. Dec., 1944
What's New in Alfalfa ..... Dec., 1944
Undercover Farming ..... Dec., 1944
Hoeing Cotton with Fire ..... Jan., 1945
Guar, Summer Growing Legume in Arizona, Jan., 1945
Didn't Plow Sod Land ..... Jan., 1945
Sweet Potato Culture ..... Feb., 1945
Sprouted Soybeans Save Feed ..... Feb., 1945
Ladino Clover ..... Mar., 1945
Giant Blue Panic Grass ..... Mar., 1945
Blue Lupine, a Valuable Legume .. Mar., 1945
Alfalfa $3 a Ton ..... May, 1945
Save Labor in Corn Growing ..... May, 1945
An Easier Way to Harvest Hay ... June, 1945
Vacuum Cleaning Clover Seed ..... June, 1945
Potato Seed Determines Production Possibilities ..... June, 1945

iry Cattle

Ration Book for Cows ..... Jan., 1945
Building a Disease-Free Herd ..... Jan., 1945
Nutritional Control of Milk Fever .. Feb., 1945
Calf Pills—A New Feed ..... Feb., 1945
Feeding Moldy Silage ..... Mar., 1945
Pastures and Roughage ..... Mar., 1945
To Strip or Not to Strip ..... Mar., 1945
Urea as a Substtiute for Protein ... Mar., 1945
Winter Dysentery Penalizes Milk Production, Mar., 1945
The Triangle of Animal Life ..... April, 1945
Dry Dock for Cows ..... April, 1945
Bang's Disease Control ..... April, 1945
How to Select a Sire ..... April, 1945
Research in Dairy Husbandry at Ithaca, April, 1945
Saving Feed and Labor ..... May, 1945
What It Costs to Raise a Heifer .... May, 1945
Modern Trends in Dairy Cattle Nutrition, May, 1945
Self-Service for Calves ..... May, 1945
Inheritance Must Be Supplemented . May, 1945
Revolutionary Feeding Discovery .. June, 1945
Keep Them Burping ..... June, 1945
Few Bulls Become Great Sires ..... June, 1945
A Leak in Dairy Farm Profits ..... June, 1945
Gestation Periods of Five Breeds of Cattle, June, 1945

Farm Machinery

Rental Charges for Machinery ..... July, 1944
Substitutes for Dairy Help .. Aug.-Sept., 1944
The Self-Propelled Combine ..... Oct., 1944
Electric Fence—Convenience or Hazard, Oct., 1944
Electricity Unloads the Corn Wagon . Nov., 1944
Care of Milking Machines ..... Feb., 1945
A "Sure Enough" Push Button Barn Cleaner, Mar., 1945
New Land Clearing Machine ..... Mar., 1945
Machine Co-op ..... April, 1945
Protects Metal from Rust ..... April, 1945
Tractors Cut Corn Costs ..... May, 1945

Fruit

The Farmer Must "Mobilize" the Soil, Mar., 1944
Pole Thinning of Peaches ..... Nov., 1944
Florida Has First Lychee Orchard .. Dec., 1944
Speed Sprayer Is Labor Saver ..... Dec., 1944
Reducing Apple Drop with Harvest Sprays, Jan., 1945
Controlling Field Mice in Orchards .. Jan., 1945
New Varieties of Small Fruits ..... Feb., 1945
Methods of Speeding Apple Picking . Feb., 1945
Thinning of Peaches ..... May, 1945
Soil Management in Young Orchards June, 1945
Sulfa Drug Immunizes Peach Trees . June, 1945

Fertilizers

Improved Fertility Saves Water, Aug.-Sept., 1944
Fertilizing To Make Water Go Further, Oct., 1944
The Precious Things of the Earth .. Oct., 1944
Secrets of Soil Organisms ..... Oct., 1944
Mightier Than the Mower ..... Oct., 1944
Deep vs. Shallow Tillage ..... Nov., 1944
Soils Take a Rest ..... Dec., 1944
Fertilizing for Big Yields ..... Dec., 1944
Danger in Improper Use of Fertilizers, Jan., 1945
Soil Fertility, Food Source ..... Feb., 1945
Humus, Working Partner of Plant Food, Feb., 1945

INDEX

Cornstalks to the Rescue ..... Mar., 1945
Fertilizer Makes Farm Acre Larger Mar., 1945
How Long Do Effects from Fertilizers Last, April, 1945
Farm Manure as a Fertilizer ..... April, 1945
Double-Quick Fertility ..... May, 1945
Balance in Plant Nutrition ..... May, 1945
Know Your Phosphates ..... May, 1945
Liming the Land ..... May, 1945
Maintaining Productivity ..... June, 1945
He Rebuilds Georgia's Soil ..... June, 1945
Good and Bad Health is Traced Back to Soils, June, 1945

Hay

Forced Ventilation Method of Curing Hay, May, 1944
Beating a Hay Shortage ..... June, 1944
Mow Curing of Hay ..... June, 1944
Curing Hay on Tripods ..... Aug.-Sept., 1944
Hubam Clover a Four-Way Crop ... Dec., 1944
Sweet Sudan in the Pasture Program May, 1945

Hogs

The Post-War Pig ..... Dec., 1944
Is Self-Feeding of Brood Sows Possible, Dec., 1944
More Pork at Less Cost ..... Jan., 1945
Conditioning Bred Sows Sensibly .. Feb., 1945
Hogs, Artichokes and Power ..... Feb., 1945
More Meat—Less Lard on the Post-War Hog, Mar., 1945
Rye Pasture for Pigs ..... Mar., 1945
Breeding for Efficient Gains ..... Mar., 1945
Round Worms of Swine ..... April, 1945
Feet and Legs ..... April, 1945
Tilt the House, Save More Pigs .... May, 1945
Grow Your Own Feeds ..... May, 1945
Anemia in Hogs Can Be Checked .. June, 1945

Horses

The Horse and the Law ..... Aug.-Sept., 1944
"Alkali Reserve" and Staying Power in Horses ..... Nov., 1944
Columbus Took a Chance ..... Dec., 1944
What Kind of Horses Do We Need? Feb., 1945

Pastures

Good Pasture Means Greater Income, Aug.-Sept., 1944
Pasture Poisoning ..... Oct., 1944
Green Pastures ..... Oct., 1944
Coarse Roughage for Cattle ..... Jan., 1945
New Pasture from Rock ..... Jan., 1945
Cattle Like "Suiter's Grass" ..... Feb., 1945
Good Pasture Management ..... Feb., 1945
Pasture with a Punch ..... Mar., 1945
To Expand the Roughage Supply .. April, 1945
Sweet Sudan in the Pasture Program May, 1945
Trends in Pasture Improving Methods, June, 1945

Poultry

Lime Those Poultry Droppings .... Nov., 1944
Daughters Are a Key to Progeny Testing, Oct., 1944
Three Ways to Figure Flock Averages, Nov., 1944
A Simplified Breeding Program .... Dec., 1944
Pigeon Heroes ..... Dec., 1944
5,000 Turkeys on One Acre ..... Dec., 1944
Which Range System? ..... Jan., 1945
Handling Poultry Manure ..... Jan., 1945
Improved Broiler Feathering ..... Feb., 1945
All Pullet Flocks May Be Post-War Necessity Mar., 1945
Dressed Poultry ..... Mar., 1945
Early Hatching Pullets Pay ..... Mar., 1945
Spotlight on Vitamin D ..... Mar., 1945
Fiber and Bulk in Poultry Rations .. Mar., 1945
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Meet the Situation ..... April, 1945
The "Why and How" of Crossbreeding, April, 1945
One-Man Poultry Farm ..... April, 1945
Poults Are Blind ..... May, 1945
Steps Take Time ..... May, 1945
Raising Geese at Ark Farm ..... May, 1945
Revolutionary Feeding Discovery .. June, 1945
Preventing Poultry Diseases ..... June, 1945
Vaccinate for Protection ..... June, 1945

Sheep

Fitting Sheep for Sales ..... Nov., 1944
Grainless Lamb Production ..... Nov., 1944
Sheep Pregnancy Disease ..... Nov., 1944
What is a Ram? ..... Dec., 1944
Some Facts About Feeding ..... Jan., 1945
Raising Sheep on Poor Feed ..... Feb., 1945
Pheno-Thiazine Salt Mixture ..... April, 1945
Good Sheep Don't Die in Debt ..... April, 1945
The Montadale—A New Breed ..... May, 1945
Lamb Pastures ..... June, 1945

Forestry

White Pine Protected from Disease July, 1945
Chemistry on a Sawdust Trail ..... Nov., 1945
Does Farm Forestry Pay? ..... June, 1945

Weeds

Nebraska's War on Weeds ..... July, 1945
Beat the Weeds for More Bushels, Aug.-Sept., 1945
"2-4-D," the New Weed Killer ..... Mar., 1945
Stop, Look and Question! ..... Mar., 1945

Vegetables

Mulch and Hill ..... June, 1945
Root-Knot Can Be Controlled ..... Nov., 1945
Custom Potato Spraying ..... Dec., 1945
Fertilizing for Big Yields ..... Dec., 1945
Air Transport for Certain Crops ... May, 1945
"Any Fool Can Grow Tomatoes" ... May, 1945
Yam Drying Comes of Age ..... May, 1945
Growing Trellis Tomatoes ..... June, 1945
Potato Seed Determines Production Possibilities ..... June, 1945

Miscellaneous

Tenant-Purchase Program ..... Feb., 1945
160 Square Rods ..... Feb., 1945
Tomorrow's Farm at Today's Prices Feb., 1945
Which Farm Lease Shall I Use? ... Mar., 1945
Urea as a Substitute for Protein ... Mar., 1945
How to Start a Car in Cold Weather . Mar., 1945
Earthworm Culture ..... Mar., 1945
Firesafe, Labor-saving Livestock Compound April, 1945
Why Control Prices? ..... April, 1945
Hints for Trapping Muskrats ..... April, 1945
Meet Sporovibrio desulfuricans .... April, 1945
Electric Wire Fence ..... April, 1945
Air Transport for Certain Crops .... May, 1945
That Rascal, the Crow ..... May, 1945
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INDEX

Cornstalks to the Rescue ..... Mar., 1945
Fertilizer Makes Farm Acre Larger Mar., 1945
How Long Do Effects from Fertilizers Last, April, 1945
Farm Manure as a Fertilizer ..... April, 1945
Double-Quick Fertility ..... May, 1945
Balance in Plant Nutrition ..... May, 1945
Know Your Phosphates ..... May, 1945
Liming the Land ..... May, 1945
Maintaining Productivity ..... June, 1945
He Rebuilds Georgia's Soil ..... June, 1945
Good and Bad Health is Traced Back to Soils, June, 1945

Hay

Forced Ventilation Method of Curing Hay, May, 1944
Beating a Hay Shortage ..... June, 1944
Mow Curing of Hay ..... June, 1944
Curing Hay on Tripods ..... Aug.-Sept., 1944
Hubam Clover a Four-Way Crop ... Dec., 1944
Sweet Sudan in the Pasture Program May, 1945

Hogs

The Post-War Pig ..... Dec., 1944
Is Self-Feeding of Brood Sows Possible, Dec., 1944
More Pork at Less Cost ..... Jan., 1945
Conditioning Bred Sows Sensibly .. Feb., 1945
Hogs, Artichokes and Power ..... Feb., 1945
More Meat—Less Lard on the Post-War Hog, Mar., 1945
Rye Pasture for Pigs ..... Mar., 1945
Breeding for Efficient Gains ..... Mar., 1945
Round Worms of Swine ..... April, 1945
Feet and Legs ..... April, 1945
Tilt the House, Save More Pigs .... May, 1945
Grow Your Own Feeds ..... May, 1945
Anemia in Hogs Can Be Checked .. June, 1945

Horses

The Horse and the Law ..... Aug.-Sept., 1944
"Alkali Reserve" and Staying Power in Horses ..... Nov., 1944
Columbus Took a Chance ..... Dec., 1944
What Kind of Horses Do We Need? Feb., 1945

Pastures

Good Pasture Means Greater Income, Aug.-Sept., 1944
Pasture Poisoning ..... Oct., 1944
Green Pastures ..... Oct., 1944
Coarse Roughage for Cattle ..... Jan., 1945
New Pasture from Rock ..... Jan., 1945
Cattle Like "Suiter's Grass" ..... Feb., 1945
Good Pasture Management ..... Feb., 1945
Pasture with a Punch ..... Mar., 1945
To Expand the Roughage Supply .. April, 1945
Sweet Sudan in the Pasture Program May, 1945
Trends in Pasture Improving Methods, June, 1945

Poultry

Lime Those Poultry Droppings .. Nov., 1944
Daughters Are a Key to Progeny Testing, Oct., 1944
Three Ways to Figure Flock Averages, Nov., 1944
A Simplified Breeding Program .... Dec., 1944
Pigeon Heroes ..... Dec., 1944
5,000 Turkeys on One Acre ..... Dec., 1944
Which Range System? ..... Jan., 1945
Handling Poultry Manure ..... Jan., 1945
Improved Broiler Feathering ..... Feb., 1945
All Pullet Flocks May Be Post-War Necessity Mar., 1945
Dressed Poultry ..... Mar., 1945
Early Hatching Pullets Pay ..... Mar., 1945
Spotlight on Vitamin D ..... Mar., 1945
Fiber and Bulk in Poultry Rations .. Mar., 1945
Prevent Cannibalism with Manure .. Mar., 1945
Meet the Situation ..... April, 1945
The "Why and How" of Crossbreeding, April, 1945
One-Man Poultry Farm ..... April, 1945
Poults Are Blind ..... May, 1945
Steps Take Time ..... May, 1945
Raising Geese at Ark Farm ..... May, 1945
Revolutionary Feeding Discovery .. June, 1945
Preventing Poultry Diseases ..... June, 1945
Vaccinate for Protection ..... June, 1945

Sheep

Fitting Sheep for Sales ..... Nov., 1944
Grainless Lamb Production ..... Nov., 1944
Sheep Pregnancy Disease ..... Nov., 1944
What is a Ram? ..... Dec., 1944
Some Facts About Feeding ..... Jan., 1945
Raising Sheep on Poor Feed ..... Feb., 1945
Pheno-Thiazine Salt Mixture ..... April, 1945
Good Sheep Don't Die in Debt ..... April, 1945
The Montadale—A New Breed ..... May, 1945
Lamb Pastures ..... June, 1945

Forestry

White Pine Protected from Disease July, 1944
Chemistry on a Sawdust Trail ..... Nov., 1944
Does Farm Forestry Pay? ..... June, 1945

Weeds

Nebraska's War on Weeds ..... July, 1944
Beat the Weeds for More Bushels, Aug.-Sept., 1944
"2-4-D," the New Weed Killer ..... Mar., 1945
Stop, Look and Question! ..... Mar., 1945

Vegetables

Mulch and Hill ..... June, 1944
Root-Knot Can Be Controlled ..... Nov., 1944
Custom Potato Spraying ..... Dec., 1944
Fertilizing for Big Yields ..... Dec., 1944
Air Transport for Certain Crops ... May, 1945
"Any Fool Can Grow Tomatoes" ... May, 1945
Yam Drying Comes of Age ..... May, 1945
Growing Trellis Tomatoes ..... June, 1945
Potato Seed Determines Production Possibilities ..... June, 1945

Miscellaneous

Tenant-Purchase Program ..... Feb., 1945
160 Square Rods ..... Feb., 1945
Tomorrow's Farm at Today's Prices Feb., 1945
Which Farm Lease Shall I Use? ... Mar., 1945
Urea as a Substitute for Protein ... Mar., 1945
How to Start a Car in Cold Weather . Mar., 1945
Earthworm Culture ..... Mar., 1945
Firesafe, Labor-saving Livestock Compound April, 1945
Why Control Prices? ..... April, 1945
Hints for Trapping Muskrats ..... April, 1945
Meet Sporovibrio desulfuricans .... April, 1945
Electric Wire Fence ..... April, 1945
Air Transport for Certain Crops .... May, 1945
That Rascal, the Crow ..... May, 1945
A Farmer Looks at Alaska ..... May, 1945
Cutting Building Costs in Half .... June, 1945
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